BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 27.] 1930. No. 9.

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

ATKEY (O. P. H.). L'épidémie de fièvre récurrente au Soudan de 1926 à 1928. [**The Epidemic of Relapsing Fever in the Sudan, 1926 to 1928.**]—*Bull. Office Internat. d' Hyg. Publique.* 1929. Nov. Vol. 21. No. 11. pp. 1932–1933.

A louse-borne type of relapsing fever which first appeared in French West Africa in 1921, gradually spread across Africa via Chad and Wadai, until it reached Darfur in September, 1926, where in one district alone 10,000 died out of a total population of 45,000. By the establishment of quarantine posts and vigorous methods of control, including the destruction of lice, the progress of the epidemic was arrested and by the autumn of 1928 the disease had been stamped out of the Province.

[The suppression of an epidemic of this magnitude, which showed every likelihoood of spreading into the densely populated regions of Kordofan and Gezira, is a remarkable tribute to the sanitary measures adopted and especially to the manner in which they were carried out.]

E. Hindle.

MALTZER (M.). La fièvre récurrente dans le cercle de Dori (Haute-Volta). [**Relapsing Fever in the Region of Dori (Upper Volta).**]—*Ann. de Méd. et de Pharm. Colon.* 1929. July–Aug.–Sept. Vol. 27. No. 3. pp. 435–441.

An account of a small epidemic of relapsing fever during 1927 and 1928 in villages of the Dori region. There were 137 cases with 27 deaths. With regard to transmission it is noted that both lice and bugs were present in very large numbers. Details are given of the clinical symptoms; the majority of the patients had two febrile attacks, but sometimes three were noted. They were treated by treparsol by mouth or novarsenobenzol. Although none of those treated by treparsol died of the disease, they all showed relapses but the duration of the febrile attacks was reduced. Intravenous injections of novarsenobenzol were found to be the simplest and most efficacious method of treatment as the symptoms disappeared within 24 hours.

E. H.

(12143) Wt P1/43 1,875 9/30 H & Sp Gp 52

i. Delanoë (P.). Contribution à l'étude du spirochète de l'Ornithodore des terriers du Maroc *Sp. marocanum*, Ch. Nicolle et Ch. Anderson 1928. [**Study of Spirochaete occurring in Ornithodorus from Burrows in Morocco.**]—*Arch. Inst. Pasteur de Tunis.* 1929. Nov. Vol. 18. No. 3 & 4. pp. 272–342. With 6 charts in text. [Refs. in footnotes.] [District Hosp., Mazagan.]

ii. Nicolle (Charles), Anderson (Charles) & Colas-Belcour (Jacques). Sensibilité du porc-épic au spirochète des terriers des petits rongeurs sauvages du Maroc *Sp. hispanicum*, var. *marocanum*. [**Susceptibility of the Porcupine to Spirochaete found in Burrows of Small Wild Rodents in Morocco.**]—*Ibid.* pp. 343–346. [2 refs.]

iii. —— & ——. Sur la notion d'espèce chez les spirochètes récurrents du Maroc et le rôle du porc-épic dans leur conservation et leur transmission naturelles. [**The Question of Species in Moroccan Relapsing Fever Spirochaetes, and the Rôle of the Porcupine in their Preservation and Transmission in Nature.**]—*Ibid.* pp. 347–351. [7 refs.]

i. The first is a lengthy polemical article in continuation of the author's views as to the nature and origin of relapsing fever in Morocco [*ante*, p. 106]. Detailed experiments are reproduced in support of his opinion that a spirochaete obtained by him from Ornithodorus inhabiting the burrows of porcupines, is the same species as that of the Mansouria strain isolated by Nicolle and Anderson from *Ornithodorus marocanus*, captured in the neighbourhood of the burrows of small wild rodents.

ii. The second article reaffirms the authors' views that in Morocco the porcupine is so rare that it can play only a secondary part as a reservoir of infection in comparison with the small rodents. Particulars are given of the successful infection of a porcupine with the Mansouria strain of relapsing fever. The animal died 10 days after being inoculated and on the two days preceding death showed spirochaetes in its blood from which the infection was reproduced in guineapigs, rats and mice.

iii. The last paper consists mainly of a reply to the first one, but contains particulars of the infection of a human subject with the Mansouria strain of spirochaete. This patient showed five febrile attacks. The authors conclude that in Morocco there is only one species of spirochaetes transmitted by ticks, namely, *S. hispanica*, and there is not sufficient reason to create a distinct species, *S. marocana*, as proposed by Delanoë.

[The reviewer is in complete agreement with the arguments advanced by Nicolle and Anderson as to the undesirability of making distinct "species" out of local strains of spirochaetes. Incidentally, this particular aspect of Moroccan spirochaetes has occupied nearly 150 pages in the last two numbers of the *Arch. Inst. Pasteur de Tunis* !]

E. H.

Nicolle (Charles), Anderson (Charles) & Colas-Belcour (Jacques). Rôle d'*Ornithodorus erraticus* dans la transmission naturelle de deux spirochètes récurrents. Danger de la propagation de la fièvre récurrente hispano-marocaine à l'Algérie et à la Tunisie. [**The Rôle of *Ornithodorus erraticus* in the Transmission in Nature of Two Relapsing Fever Spirochaetes. Danger of Spread of Spanish-Moroccan Relapsing Fever to Algeria and Tunis.**]—*C.R. Acad. Sci.* 1929. Dec. 30. Vol. 189. No. 27. pp. 1220–1221. [2 refs.]

Attention is drawn to the wide distribution of *Ornithodorus erraticus* [which includes *O. marocanus*, see this *Bulletin*, *ante* p. 324], since it

extends along the coast of the Mediterranean from Spain to Egypt. Consequently there is every likelihood of the Spanish Moroccan type of relapsing fever spreading towards the East and it is necessary to examine the cases of relapsing fever occurring in Tunis, to see whether they belong to this type pathogenic to guineapigs, or to the ordinary louse-borne *S. recurrentis*. In addition to *S. hispanica*, the tick *O. erraticus* also transmits *S. normandi* or its variety *carthaginensis*, and in Algeria it would be interesting to trace the distribution of these two types of relapsing fever.

E. H.

Nicolle (Charles) & Anderson (Charles). Sur la nécessité de l'identification et d'un contrôle des spirochètes récurrents entretenus dans les laboratoires (note complémentaire). Avec quelques réflexions au sujet de l'homogénéité des spirochètes du groupe Dutton. [**Necessity for the Identification and Control of Relapsing Fever Spirochaetes maintained in Laboratories : Homogeneous Nature of the Dutton Group of Spirochaetes.**]—*Arch. Inst. Pasteur de Tunis*. 1929. Nov. Vol. 18. No. 3 & 4. pp. 268–271. [2 refs.]

This article is in continuation of that reviewed in this *Bulletin*, Vol. 26, p. 659. The authors have received letters from Schüffner and Bruynoghe confirming their opinion that the Amsterdam virus was *S. duttoni* and not *S. recurrentis*. Also Bruynoghe found that a second strain at his laboratory known as the Hamburg strain of *S. recurrentis* was really *S. duttoni*, a good example of the necessity for constant care in checking the identity of laboratory strains. Finally, the authors state that the relapsing fever spirochaetes seem to fall into two groups : a very homogeneous *S. duttoni* group, all the strains of which seem to be serologically identical (with the doubtful exception of this Amsterdam-Hamburg strain), in marked contrast with the remaining forms, all of which show great variation and a tendency to break up into serologically different races, so that one could almost form new species out of each strain.

E. H.

Delamare (G.). Points épigastrique, cystique et appendiculaire d'origine récurrentielle. [**Epigastric, Cholecystic and Appendicular Pains due to Relapsing Fever.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1930. Feb. 3. Vol. 46. 3rd Ser. No. 3. pp. 109–110.

Out of 50 patients infected with relapsing fever 30 had pain in circumscribed regions. 21 of these regions were epigastric, in the median line between the umbilicus and xiphoid cartilage. 7 patients with congestion of the liver showed tenderness in the region of the gall bladder. Finally, in 2 cases the region of the appendix was painful, the symptoms being such that one of the patients was operated upon and the appendix removed. Observations showed, however, that the symptoms were due to relapsing fever. Occasionally both epigastric and gall bladder pains occurred in the same patient, and once gall bladder and appendicular pains occurred together.

E. H.

DELAMARE (G.). La courbe thermique de la récurrente constantinopolitaine de 1920–1921. [**The Temperature Curve in Constantinople Relapsing Fever during 1920-1921.**]—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 904–906.

A study of the temperature curves of 50 cases of relapsing fever in Constantinople, some of which were treated by injections of 914, whilst others were untreated. The results show that the spirochaetes of this epidemic possessed a high degree of arsenic-resistance. The nature and significance of the temperature curves are discussed in detail.

E. H.

DE MOOR (C. E.) & VEDDER (A.). Een geval van febris recurrens (type Duttoni) te Amsterdam. [**A Case of Relapsing Fever (Type *duttoni*) in Amsterdam.**]—*Nederl. Tijdschr. v. Geneesk.* 1930. Mar. 8. 74th Year. 1st Half. No. 10. pp. 1227–1230. With 1 chart in text & 1 plate.

The case was one of relapsing fever due to *Spirochaeta duttoni*, which is becoming notorious for its production of these laboratory infections. A diagnosis was made by examination of the blood by the thick drop method with finding of the spirochaetes. Of the animals inoculated with the patient's blood, two monkeys, two guineapigs and two mice, only one of the mice developed demonstrable spirochaetal infection. An intravenous inoculation of salvarsan brought the patient's infection quickly to an end, thus acting as *therapia magna sterilisans* in the sense of EHRLICH. A slight rise of temperature 7 days after the inoculation probably represented all that there was in this case of a relapse ; no spirochaetes were found in the blood. No certain mode of infection of the patient was discovered, but it is probable that it occurred through a skin wound in the course of inoculation of the laboratory spirochaete strain from mouse to mouse.

W. F. Harvey.

TODD (John). **Treatment of Relapsing Fever.** [Correspondence.]—*Brit. Med. Jl.* 1930. Feb. 15. p. 312.

The writer, from Nyasaland, recommends the use of intramuscular injections of sodium potassium bismuth tartrate for the treatment of tick fever, instead of the usual novarsenobenzol. The latter is much more expensive and must be administered intravenously ; in addition, although it brings down the fever rather more quickly than the tartrate, relapses are not uncommon, and two or three injections are generally necessary before the symptoms disappear. Sodium potassium bismuth tartrate brings down the temperature in 36 hours and relapses are almost unknown. The dosage for an adult is two intramuscular injections on two consecutive days, each of 0·2 gm. of the drug dissolved in 2 cc. sterile water ; for a child 2 to 10 years old, the dose is halved ; and for a baby under 2 years old, a single injection of 0·1 gm. is sufficient.

E. H.

ROSKIN (Gr.) & LEVINSON (L. B.). Arzneimittel und ultraviolette Strahlen. IV. Mitteilung. Die kombinierte Wirkung von ultravioletten Strahlen und Salvarsan auf die *Spirochaeta Duttoni*. [**Combined Action of Ultraviolet Rays and Salvarsan on *S. duttoni*.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1930. Vol. 65. No. 1/2. pp. 135–141. [8 refs.] [Microbiol. Research Inst., Education Commissariat R.S.F.S.R., Moscow.]

Mice were inoculated with similar doses of a Berlin strain of *S. duttoni*, and when spirochaetes appeared in the blood were treated by

the injection of 0·00125 gm. salvarsan (" Altsalvarsan ") per 20 gm. body weight.

Some of these mice were then exposed for 15 minutes to the action of ultraviolet rays at a distance of 40 cm. from the lamp, whilst others were kept as controls. Blood films of the mice were examined daily for 16 to 20 days and finally the brains inoculated into other mice in order to determine whether the infections had disappeared. Out of 47 mice exposed to ultraviolet rays after treatment 35 were cured and 12 not, whilst out of 41 controls not exposed to the lamp only one was cured by the injection of salvarsan. It is evident, therefore, that exposure to ultraviolet rays greatly increases the therapeutic and sterilizing action of salvarsan, in mice infected with *S. duttoni*.

E. H.

Tschirejkin (W. Ch.). Ueber die Salvarsantherapie der *Recurrens bucharica*. [**Salvarsan Therapy in Bokharan Relapsing Fever.**] *Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Apr. Vol. 34. No. 4. pp. 211–220. With 10 text figs. [20 refs.]

Ten cases of Bokharan relapsing fever were treated by injections of salvarsan or its derivatives, but all except one showed relapses. Clinical details of the cases are given.

E. H.

Namikawa (Hiroshi). Ueber zwei Fälle von accidenteller Recurrens infektion im Laboratorium, und Veränderung der Virulenz durch Menschen-Passage. [**Two Cases of Accidental Laboratory Infections with Relapsing Fever and Alterations in the Virulence in Human Passage.**]—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1929. Dec. No. 297. [In Japanese. German summary pp. 65–66.]

A description of two laboratory infections successfully treated by neosalvarsan. After the human passage, the virulence of the strain towards mice seems to have been very much weakened.

E. H.

Levaditi (C.), Anderson (T.), Selbie (F. R.) & Schoen (R.). Présence du spirille de la fièvre récurrente (*Sp. Duttoni*) dans le cerveau des animaux immuns. [**The Presence of Relapsing Fever Spirochaetes (*S. duttoni*) in the Brain of Immune Animals.**]—*Bull. Acad. Méd.* 1929. Dec. 24. Year 93. 3rd Ser. Vol. 102. No. 42. pp. 705–710. With 3 text figs. [7 refs.]

A study of the Brazzaville strain of *S. duttoni* in mice, rats, rabbits and monkeys, showed that in the majority of cases where the brain was invaded by the virus, sooner or later there was a cytological reaction of the nervous tissue resulting in the production of a form of encephalitis. Although as a rule it is impossible to find spirochaetes in the nervous system of such animals, occasionally they may be seen in the cortex near the surface of the convolutions, but never in the cytoplasm of the nerve cells or neuroglia. The authors consider, therefore, that exceptionally the ultramicroscopic virus of this disease, which ordinarily is the only stage present during residual infections of the nervous system, may sometimes develop into the spirochaetal form.

These observations are extended to include cases of general paralysis, and it is suggested that as a rule the spirochaetal form is only one of the stages in the development of a neurotropic virus of *S. pallida*; the presence of isolated groups of spirochaetes in the cortex is considered to support the view that their sudden development is responsible for the production of the apoplectiform ictus in cases of this disease.

E. H.

Velu (H.), Balozet (L.) & Zottner (G.). Neurotropisme de *Spirochaeta hispanicum* (souche de Mansouriah) pour le lapin; forme nouvelle de l'infection inapparente. [**Neurotropism of *Spirochaeta hispanica* for the Rabbit; a New Form of Inapparent Infection.**]—*C.R. Soc. Biol.* 1930. Feb. 14. Vol. 103. No. 6. pp. 381–383. [4 refs.]

Rabbits inoculated with this strain of relapsing fever were found to show residual brain infections, although in some cases the spirochaetes had never been found in the blood. [This is an independent confirmation of Schlossberger and Wichmann's observations on the same subject. See this *Bulletin*, Vol. 26, p. 664.]

E. H.

Pampana (Emilio). Sul neurotropismo dello "*Spironema hispanicum*" (febbre ricorrente spagnuola). [**The Neurotropism of *Spirochaeta hispanica*.**]—Reprinted from *Bull. e Atti Reale Accad. Med. di Roma.* 1928–29. Vol. 55. 7 pp. [Hyg. Inst., Univ., Rome.]

The spirochaete of Spanish relapsing fever differs from that of other types in producing an attack when inoculated into guineapigs and in having for its vector the *Ornithodorus marocanus*. Examination of the brains of guineapigs recovered from infection showed no spirochaetes nor did their blood, nevertheless out of seven guineapigs inoculated with emulsions of brain tissue the disease was produced in six. Others injected with the blood of the same animals from which the brain emulsions had been made did not contract the disease. The brain was shown to be infective 100 days after the primary inoculation.

H. Harold Scott.

Remlinger (P.) & Bailly (J.). Spirille marocain (*Spirochaeta hispanicum* var. *marocanum*, souche Tetuan) et récurrentothérapie. [**Moroccan Relapsing Fever and its Therapeutic Use.**]—*C.R. Soc. Biol.* 1929. Nov. 29. Vol. 102. No. 32. pp. 635–637. [Pasteur Inst. of Morocco, Tangiers.]

The authors call attention to the advantages of using this strain of relapsing fever for the treatment of neuropsychoses and in particular general paralysis. The strain can easily be maintained in guineapigs by making a passage every 15 or 20 days. In order to produce infection it is only necessary to take a drop of blood from the ear of an infected guineapig and to place it on the conjunctiva of the patient undergoing this treatment. If desirable the course of the disease can readily be checked by the use of arsenobenzol. The virus can be transported by using infected ticks, or by simply defibrinating infected blood and preserving it *in vitro* in glass pipettes plugged with cottonwool. At room temperature (25° C.), such blood was found to be infective after 12 days and probably retains its virulence for longer periods.

[According to SAGEL (see this *Bulletin*, Vol. 26, p. 654) Ornithodorus infected with *S. berbera* produced such severe infections that this method of infection had to be abandoned; therefore it seems preferable to use infected blood, as suggested by the authors.]

E. H.

REMLINGER (P.) & BAILLY (J.). Transport à longue distance du spirochète hispano-marocain pour les besoins de la récurrentothérapie. [**Transportation over Long Distances of the Spanish Moroccan Spirochaete, for Therapeutic Use.**]—*Bull. Soc. Path. Exot.* 1930. Feb. 12. Vol. 23. No. 2. pp. 153–155. [1 ref.]

Infected blood, defibrinated and collected in pipettes, was found to retain its infectivity for at least 20 days, and in the absence of ticks this forms a ready means of forwarding the virus. [See above.]

E. H.

HATT (Pierre). Observations sur l'évolution des spirochètes des fièvres récurrentes chez les ornithodores. [**Observations on the Development of Relapsing Fever Spirochaetes in Ornithodorus.**]—*Arch. Inst. Pasteur de Tunis.* 1929. Nov. Vol. 18. No. 3 & 4. pp. 258–264. With 5 text figs.

The author has studied sections of the organs of ticks fed on various strains of relapsing fever and dissected after different intervals and finds strong evidence in support of the view that the spirochaetes enter the cells of the tick and there break up into coccoid or bacillary forms from which young spirochaetes subsequently develop. In the case of *S. duttoni* in *O. moubata*, the disappearance of spirochaetes is complete after 3 days, but in the case of *S. hispanica* in *O. savignyi*, fragments of spirochaetes were found up to the 20th day, although on the 5th day spirochaetes appeared to be breaking up in the epithelial cells of the gut and on the 9th day these cells contained only coccoid and bacillary forms. The coelomic fluid of these ticks was constantly negative for spirochaetes up to the 26th day after the infective feed, when it became strongly positive and all stages were observed from short forms with only three spiral turns up to long forms with eight spirals.

In a third series of experiments in which *O. savignyi* were infected with *S. duttoni*, the spirochaetes reappeared in the ticks on the 19th day after the infective meal. Similar results were obtained with *S. normandi* in the same species of tick. In only one instance, a large adult female *O. savignyi*, were spirochaetes observed in the coelomic fluid of infected ticks as early as 6 days after the infective meal. As a general rule the author used nymphal stages for his experiments and never succeeded in finding spirochaetes in their coelomic fluid until the developmental period had elapsed, 20 days in one instance, 19 in another, etc.

A section of the ovary of an *O. moubata* infected with *S. hispanica* (see Fig. 5) is of especial interest. Only one egg in the ovary was found to contain spirochaetes, although the adjacent egg showed a few against its membrane, and this egg containing spirochaetes was the only one which contained any granules.

The author admits that his observations are somewhat fragmentary, but such as they are support the view that the spirochaete loses its

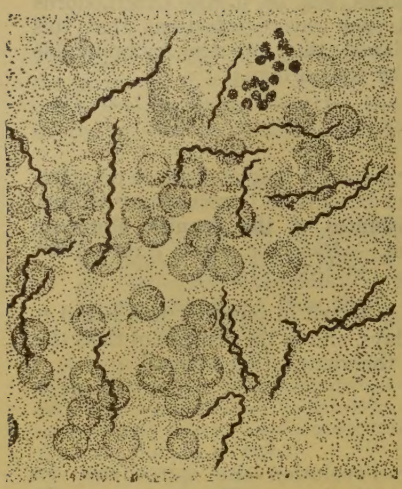

Fig. 1.

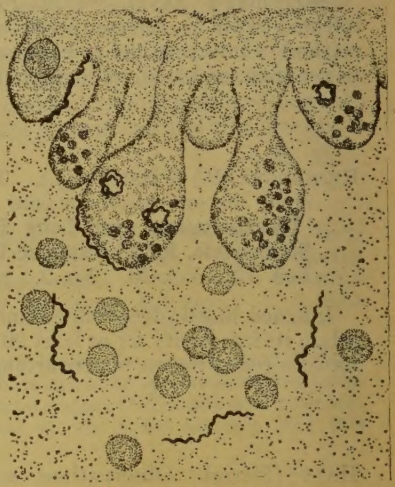

Fig. 2.

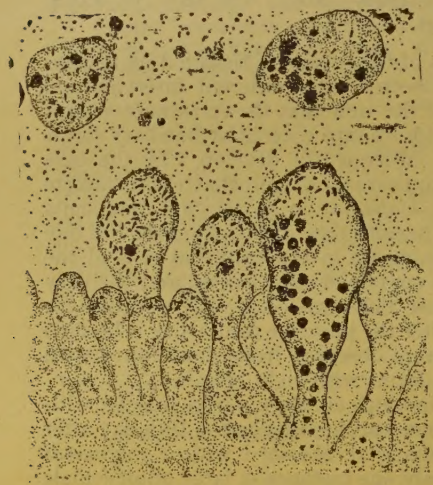

Fig. 3.

Fig. 5.

Fig. 1. *Spirochaeta duttoni* in the intestinal contents of *Ornithodorus moubata*, one hour after the infective meal.

Fig. 2. *Sp. duttoni* in the intestinal epithelium of *Orn. moubata*, two hours after the infective meal.

Fig. 3. Intestinal Epithelium of *Orn. moubata*, three days after infection by *Sp. duttoni*.

Fig. 5. Ovary of *Orn. moubata*; two eggs, one of which is infected with *Sp. hispanicum*.

[Reproduced from *Archives de l'Institut Pasteur de Tunis.*]

spiral form in the tick and breaks up into small forms which form the starting point of a new cycle of development.

E. H.

Czarkowska (J.) & Blank-Weissbeg (St.). Badania nad udziałem pluskwy (*Cimex lectularia*) w przenoszeniu duru powrotnego. Le rôle de punaise (*Cimex lectularia*) dans la transmision de la fièvre récurrente. [**The Rôle of the Bedbug** (*Cimex lectularius*) **in the Transmission of Relapsing Fever.**]—*Medycyna Doświadczalna i Społeczna.* Warsaw. 1930. Vol. 12. No. 1–2. In Polish. pp. 110–117. [7 refs.] French summary pp. 117–118. [State Hyg. Inst., Warsaw.]

The spirochaetes were found in the anterior part of the alimentary canal of bedbugs, up to 46 days after an infective feed. 24 to 48 hours after being ingested the spirochaetes become motionless, but retain their form. 6 to 7 days after infection very active spirochaetes appear in the haemolymph which may indicate some evolution. The injection of infected bugs up to the 15th day, and also of haemolymph containing spirochaetes, produces infection in mice.

E. H.

Cuboni (E.). Sur le pouvoir spirochéticide du sérum de sang de quelques animaux. [**Spirochaeticidal Action of the Blood Serum of Certain Animals.**]—*Bol. Sezione Ital., Soc. Internaz. di Microbiologia.* Milan. 1929. Dec. Vol. 1. No. 12. pp. 274–275. [Sero-therap. Inst., Milan.]

——. Sul potere spirocheticida del siero di sangue di alcuni animali.—*Bol. Istituto Sieroterap. Milanese.* 1929. Dec. Vol. 8. No. 12. pp. 813–817. German summary pp. 817–818. [9 refs.]

The author mixed 1·5 cc. of each serum studied, either fresh or inactivated, with 0·2 cc. of a suspension of *S. duttoni* obtained from the blood of a mouse at the height of the first attack. For each species of animal the blood of 4–12 individuals was examined. The results show that this spirochaete will live in the fresh or inactivated serum of guineapigs, rabbits, pigeons, fowls and horses. Sometimes it remained alive in fresh pig serum, but usually the serum was spirochaeticidal. The fresh serum of cattle, goats and sheep invariably killed all the spirochaetes within 1 to 2 hours at a temperature of 37° C., but this action disappeared when the serum was inactivated by heating.

E. H.

Remlinger (P.), Catanié & Bailly. Un cas de fièvre récurrente à spirochètes virulents pour le cobaye dans la zone espagnole du Maroc. [**Case of Relapsing Fever with Spirochaetes Virulent to the Guineapig in Spanish Morocco.**]—*Arch. Inst. Pasteur de Tunis.* 1929. Nov. Vol. 18. No. 3 & 4. pp. 383–386. [4 refs.]

The record of a case of relapsing fever occurring in a native who had been bitten by ticks in the Spanish zone of Morocco. The blood of the patient was inoculated into guineapigs which became infected showing a succession of febrile attacks accompanied by the presence of spirochaetes in the blood. This organism was compared with other strains of the same region and seems to belong to the group which includes *S. hispanica*, *S. hispanica* var. *marocana*, and *S. sogdiana*.

E. H.

Jahnel (F.) & Pentschew (A.). Ueber " Infektionen " von Vögeln mit Rekurrensspirochäten und Säugetiertrypanosomen. [**The " Infection " of Birds with Relapsing Fever Spirochaetes and Mammalian Trypanosomes.**]—*Zent. f. Bakt.* I. Abt. Orig. 1930. Jan. 7. Vol. 115. No. 3/4. pp. 167–168. [7 refs.] [Kaiser Wilhelm Inst., Munich.]

Small birds (" rice-birds ") when inoculated with large doses of Spanish, Russian and African strains of relapsing fever, showed spirochaetes in the blood after a few hours, but these invariably disappeared within 24 hours and no relapses ever occurred. Also no trace of residual infection could be found in the brains of these inoculated birds. Similar results were obtained by the inoculation of *Trypanosoma brucei*, but these only appeared in the blood in very scanty numbers and soon disappeared.

E. H.

Remlinger (P.) & Bailly (J.). Passage de *Spirochaeta hispanicum* var. *marocanum* (souche Tetuan) de la mère au foetus. [**The Passage of *Spirochaeta hispanica* var. *marocana* from the Mother to the Foetus.**] —*C.R. Soc. Biol.* 1929. Dec. 6. Vol. 102. No. 33. pp. 741–742. [Pasteur Inst. of Morocco, Tangiers.]

In common with other strains of relapsing fever that have been examined with regard to this problem, the spirochaetes of a Tetuan strain of *S. hispanica* var. *marocana* were found to pass from infected female guineapigs to their offspring at all stages of gestation. The infection could not be transmitted by means of the milk of infected animals.

E. H.

Carral (G.) & Chainet (P.). Sur trois cas de bronchite sanglante de Castellani, forme aiguë, observés chez des Européens et traités avec succès par l'acétylarsan. [**Three Acute Cases of Castellani's Bronchial Spirochaetosis, observed in Europeans and successfully treated by Acetylarsan.**]—*Bull. Soc. Path. Exot.* 1930. Mar. 12. Vol. 23. No. 3. pp. 296–306.

Clinical details are given of three cases, showing the usual symptoms of this bronchial affection in which *Spirochaeta bronchialis* was present in the sputum in large numbers. The intramuscular injection of 3 cc. of acetylarsan every 4 days caused the symptoms to disappear ; first the cough, then the expectoration, next the pale red colour of the sputum gradually disappeared, and finally after 26, 29 and 36 days respectively, no abnormal pulmonary signs could be detected. The spirochaetes diminished in numbers but only disappeared after 30 to 40 days treatment.

E. H.

i. Seguin (P.). *Treponema calligyrum* et ultra-virus spirochétique. [*Spirochaeta calligyra* **and Spirochaetal Ultra Virus.**]—*C.R. Soc. Biol.* 1930. May 23. Vol. 104. No. 17. pp. 247–248. With 1 text fig.

ii. Manouelian (Y.). Gommes syphilitiques et formes anormales du tréponème. Ultra-virus syphilitique. [**Syphilitic gummata and Abnormal Forms of the Spirochaete. Syphilitic Ultra-Virus.**]—*Ibid.* pp. 249–251. With 1 text fig.

These two articles adduce fresh evidence in support of the view that spirochaetes have a granular phase.

i. Seguin working with *Spirochaeta calligyra*, an organism first isolated by Noguchi from genital condylomata, found that in cultures

two to three weeks old, typical division forms were very rare, but many abnormal forms were present. By a special staining method, to be described later, the author found very small spirochaetes 1 to 2μ in length each with a drawn-out spiral extremity resembling a terminal flagellum. These forms appear as mere granules, under dark ground illumination, and it is only after the special method of staining that the terminal spiral filament becomes evident. All intermediate stages were found between these minute forms and the normal spirochaete.

ii. Manouélian calls attention to the fact that spirochaetes are generally impossible to find, or extremely rare, in tertiary lesions of syphilis, although common at other stages of the disease. The study of sections of gummatous lesions has shown the presence of all stages from very minute granular forms through individuals with one, two, three spirals up to normal spirochaetes, but all these forms including the granules have a spiral filament. The small granular forms are considered capable of passing through filters. [It is evident that these forms are identical with the motile granule stage of spirochaetes that have been described by many previous observers especially in the case of relapsing fever spirochaetes, e.g., LEISHMAN, BALFOUR & HINDLE. By the special technique developed by Seguin the motility of these forms is shown to be due to a terminal spiral filament. It is of interest that KNOWLES, GUPTA and BASU (*ante*, p. 110) observed very short spirochaetes with a fine flagellum in the case of *S. anserina* in the tick.]

E. H.

MARCHOUX (E.) & CHORINE (V.). Le sang des poules piquées par les Argas est virulent en l'absence de spirochètes apparents. [**The Blood of Fowls bitten by Argas is virulent in the Apparent Absence of Spirochaetes.**]—*C.R. Soc. Biol.* 1930. May 23. Vol. 104. No. 17. pp. 259–260.

The authors found that fowls exposed to the bites of infected Argas often showed a rise in temperature within 12 hours, and although no spirochaetes could be detected by microscopical examination, the subinoculation of this blood into other fowls showed that it contained the infection. The authors conclude that in the case of the fowl spirochaete there is an invisible stage of the organism which precedes the appearance of the spiral forms. [It seems possible that the very short forms described above may have been present in the circulation.]

E. H.

MORODER MUEDRA (Juan). Estado actual del cultivo del treponema de la fiebre recurrente. [**Cultivation of** *Spirochaeta recurrentis*.]—*Medicina Países Cálidos.* Madrid. 1929. Nov. Vol. 2. No. 6. pp. 552–562. [40 refs.]

Reviewing the literature the author notes the irregularity of results of attempts at cultivation of the spirochaete of relapsing fever. He himself obtains uniformly positive results from a medium of pure rabbit-serum under anaerobiosis.

H. Harold Scott.

REMLINGER (P.) & BAILLY (J.). La fièvre récurrente au Maroc. Le spirochète marocain. [**Relapsing Fever in Morocco. The Moroccan Spirochaete.**]—*Bull. Soc. Path. Exot.* 1929. Nov. 13. Vol. 22. No. 9. pp. 818–862. [35 refs.]

A useful summary of the present state of our knowledge of this relapsing fever.

E. H.

LEPTOSPIROSIS.

SCHÜFFNER (W.). Ueber das Vorkommen der Weilschen Infektion in Holland während der Jahre 1924–1929. [**The Incidence of Weil's Disease in Holland during 1924 to 1929.**]—*Arch. f. Hyg. u. Bakt.* 1930. Jan.–Feb.–Mar. Vol. 103. No. 1–3. pp. 249–257. With 1 text fig. [Inst. of Trop. Hyg., Amsterdam.]

During this period the author, together with his assistants, has observed 47 cases of Weil's disease at the Tropical Institute in Amsterdam; 11 out of the 47 patients died of the disease, usually on the 8th to the 11th day. Although 26 out of the 47 cases occurred during the months July to October, the others were spread fairly evenly among the remaining months, a matter of some importance in considering the possible influence of contact with water in the epidemiology of the disease. 21 of the patients had a record of having fallen in ditches or canals generally containing more or less impure water. The author, however, after numerous experiments, has failed to obtain any evidence in support of BAERMANN and ZUELZER's theory that the saprophytic water leptospira, which is common in Dutch waters, may acquire pathogenic properties for either guineapigs or mice. He is of the opinion, therefore, that in such cases of water infection, the water must have been previously contaminated by the urine of infected rats. Many of the other patients had worked in places where the chances of rat contamination were very considerable.

Jaundice was observed in 37 out of the 47 cases. With reference to the diagnosis of the disease, leptospira were cultured from the blood, organs, or urine of 12 cases. As soon as the jaundice appears the leptospira fall in numbers and are very difficult to find. Leptospira pathogenic to guineapigs were not found in the urine with any regularity but were observed in very severe cases about the 8th or 9th day. One of the cases that showed no signs of jaundice gave a positive result with blood culture. The majority of the cases, 35, were diagnosed by serological tests employing agglutination and lysis.

Details are given of an interesting case in which the patient's blood gave positive reactions for leptospira in dilutions of 1 : 50,000, but also contained Eberth's bacillus. The patient developed typhoid fever, but the bacillus was never agglutinated by dilutions of the blood higher than 1 : 100, whilst after two months 1 : 10,000 gave a positive reaction with leptospira. Dr. VITRINGA informed the author that out of 85 cases of typhoid the sera of 10 agglutinated leptospira which suggests the possibility of double infections. Another anomalous case is described in which the patient's blood gave positive reactions with four species of bacilli in addition to leptospira.

In conclusion the author points out that if Weil's disease is derived from the water leptospira, Holland, with its numerous ditches and canals, might be expected to show a much higher incidence of the disease.

E. Hindle.

RUYS (A. Charlotte). Een merkwaardig geval van de ziekte van Weil. [**An Exceptional Case of Weil's Disease.**]—*Nederl.-Tijdschr. v. Geneesk.* 1930. Jan. 18. 74th Year. 1st Half. No. 3. pp. 273–275. With 1 text fig. [1 ref.]

Typical Weil's disease shows, besides high fever, symptoms of great malaise, severe muscular pain, some renal affection and usually jaundice.

The history in this case is of a 7-year old child who had fallen into the water ten days before admission to hospital. But before this happened he had complained of abdominal pain and had suffered from diarrhoea and sometimes vomiting. On admission to hospital he was found to have a temperature of 40·2° C. [104·4° F.], appeared only moderately ill, and had only a trace of albumin in the urine. After a week's illness the temperature had fallen to normal. Agglutination tests of the patient's serum to typhoid and paratyphoid proved negative, but so also did the agglutination-lysis test with spirochaetes of Weil's disease. It was not until the 11th day of illness that this latter test became positive with a titre of 1–2,500. Intraperitoneal injection of 4 cc. urine in a guineapig gave rise to an infection, with spirochaetes in the peritoneal fluid and blood. Later still the agglutination-lysis test showed the very high titre of 1–50,000 although there had been no relapse. The spirochate isolated was very virulent and showed certain antigenic peculiarities in the reaction of guineapig's sera inoculated with it. These pointed to the distinct separation of the agglutination and lysis phenomena in serum tests. Lysis appeared in the inoculated guineapigs before agglutination. When, with further inoculation, the agglutination of spirochaetes did make its appearance it was in the lower dilutions of serum only, while the lysis occurred with the higher dilutions. It is therefore advisable in such a test not to be content with low dilutions of serum, but to carry it out with both low and high dilutions. The test is a microscopical one with dark field illuminations.

W. F. Harvey.

Slot (J. A.). Leptospirosen in het district Belinjoe (Banka). [**Leptospirosis in Banka.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1929. Dec. 1. Vol. 69. No. 12. pp. 1211–1215. With 1 plate. [3 refs.]

The author quotes one certain case (in a European) and 3 possible cases (in Chinese) of Weil's disease, which occurred in the tin mining district of Banka, and from this (rather limited) material deduces the possibility that the disease might be transmitted in another way than by infected water (bathing water in Sumatra, open canals in Holland). On Banka transmission by water is said to be unlikely, because: (1) surface water often contains free organic acids; (2) common bathing places are used by groups of 40–500 labourers without any epidemic spread of the disease which, according to the author, should occur; (3) apparently only few rats are carriers of the leptospira (48 examined with negative results).

W. J. Bais.

Piza (José de Toledo) & Gomes (Luiz de Salles). Molestia de Weil em S. Paulo (Nota previa). [**Weil's Disease in S. Paulo.**]—*Ann. Paulist. Med. e Cirurg.* 1930. Feb. Vol. 21. No. 2. pp. 23–32. With 2 plates. [2 refs.]

A Brazilian, 18 years of age, was sent to hospital on the fourth day of illness diagnosed as typhoid fever, complaining of headache, shivering and general pains. Slight jaundice was noticed, and on the next day blood was withdrawn for inoculation of guineapigs for leptospiral infection and the Costa Cruz reaction for yellow fever. The jaundice increased and the patient became delirious and prostrated; he rallied a few days later, and made a complete recovery. No leptospira was found in the urine. Seven guineapigs in all were inoculated, the first with the blood of the patient, the others each with blood from the preceding. The first died in five

days and leptospira were found in the kidneys and in those of the fifth also, but none in the others although the fifth had been injected with blood from the fourth. Culture of the heart blood in Noguchi's medium gave no result. The Costa Cruz reaction was negative, as was haemoculture for *Bact. typhosum.* [This case affords confirmatory evidence of the liability of confusing Weil's disease with yellow fever during an epidemic of the latter.]

H. Harold Scott.

Cattaneo (Luigi). Contributo alla conoscenza della spirochetosi ittero-emorragica in provincia di Pavia. [**A Case of Leptospirosis icterohaemorrhagiae in Pavia.**]—*Riforma Med.* 1929. Nov. 9. Vol. 45. No. 45. pp. 1513–1514, 1517. With 2 text figs. [17 refs.] [Inst. of Med. Path., Univ., Padua.]

An interesting case is here recorded of a man of 25 years, who killed a large rat, and just afterwards trod in the blood of the animal. He had an abrasion of the foot. Two days later he began to suffer with headache, rise of temperature and general pains. Typhoid was suspected, but blood-culture and agglutination tried on the seventh day were both negative. Jaundice now appeared, and a fresh sample of blood was taken and inoculated into a guineapig. The animal died in ten days, presenting a typical picture of leptospira infection and dark ground examination as well as silver preparations revealed the organism in large numbers. Injected into a second animal, this caused death in six days. The patient's temperature came to normal in the fifth week, the jaundice persisting for another fortnight. Recovery was then uninterrupted.

H. Harold Scott.

Zimmermann (E.). Diagnostik, Therapie und Fragen der Epidemiologie der Weilschen Krankheit. [**Diagnostic, Therapeutic and Epidemiological Problems of Weil's Disease.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 267–272 (351–356). [Hyg. Inst., Univ., Freiburg i.Br.]

A general account of these questions. With reference to the epidemiology of the disease, the author describes two experiments in which attempts were made to infect guineapigs with water spirochaetes, of the Freiburg and Leiden strains, respectively. The first experiment with 7 guineapigs gave negative results, but in the second, 10 guineapigs were inoculated on three successive days with 6–7 cc. of a rich culture of water spirochaetes. Cultures were made from the heart blood every day for 3 weeks, but only in one instance were spirochaetes found, and then only on the day following the inoculation. Cultures of this recovered spirochaete were inoculated into 10 more guineapigs but with negative results. In the neighbourhood of Freiburg, spirochaetes were found in 13 out of 21 samples of water; also about 10 per cent. of the rats were infected with the organism. The relative importance of the two in the epidemiology of Weil's disease is not easy to decide. In the discussion Uhlenhuth pointed out, that possibly owing to climatic conditions in Europe, it was difficult to produce infection with water spirochaetes. On the other hand, a considerable percentage of rats harboured spirochaetes in a virulent form, and probably spread the infection.

E. H.

ZUELZER (Margarete). Beiträge zur Weilfrage. [**The Problem of Weil's Disease.**]—*Arch. f. Hyg. u. Bakt.* 1930. Jan.–Feb.–Mar. Vol. 103. No. 1–3. pp. 282–297. [41 refs.]

After a discussion of some of the arguments that have been advanced against the author's view that all pathogenic strains of leptospira are derived from the saprophytic water form, Zuelzer describes some very interesting experiments on this subject.

Young guineapigs, weighing about 150 gm., were inoculated on three successive days with 7 cc. of a pure culture of a Heyden strain of water leptospira. Two days after the last inoculation and on successive days, 0·2 cc. of blood was removed from each animal by heart puncture and cultures from the blood examined for three weeks or longer. Out of 60 guineapigs inoculated with these water leptospira, only one showed organisms in its blood, in a culture of heart blood collected 10 days after the last injection. These leptospira of the first passage were similarly inoculated into 45 other guineapigs of which 3 became infected, all on the 15th day. After this second passage the strain was lost owing to an epidemic among the guineapigs.

It is interesting to note that the serological properties of the spirochaete changed after passage through the guineapigs. An antiserum that agglutainted the original water strain in dilutions of 1 : 10,000 agglutinated the spirochaetes of the first passage in 1 : 300 dilutions only, and had still less effect on those of the second passage. The serum of the first passage guineapig showed a slight formation of antibodies, as it agglutinated the water strain in dilutions of 1 : 50, and the first passage strain in 1 : 100. The sera of the three guineapigs of the second passage no longer had any action on the original water strain spirochaetes, but only on those of the second passage. The serum of one of these guineapigs also had a slight action on the first passage spirochaetes.

Finally, the author discusses the general affinities of water spirochaetes with the pathogenic strains and points out that both can be divided into various serological types. Various names have been applied to pathogenic strains such as *S. hebdomadis*, *S. pyrogenes*, *S. akiyami*, etc., but the available evidence supports the view that they are all varieties of the ubiquitous water leptospira which, under exceptional circumstances, may acquire the power of living in the bodies of animals, and at the same time acquire different serological properties.

E. H.

BASILEWSKY (B. G.). Ueber die Kiewer Wasserspirochäten vom Typus der *Sp. icterohaemorrhagiae*. [**Kiev Water Spirochaetes of the Type** *Sp. icterohaemorrhagiae*.]—*Zent. f. Bakt.* I. Abt. Orig. 1930. Mar. 28. Vol. 116. No. 2/3. pp. 173–179. [12 refs.] [Inst. of Hyg. & Bact., Kiev.]

The author cultured 24 samples of water from various sources in and around Kiev and found all except two contained leptospira. Five of these strains were examined serologically and also compared with Schüffner's Krommenie strain and the Erlangen-Angerer strain. Agglutination, lysis, culture in the presence of immune serum and the adhesion test were used for the comparison of these strains, and all the Kiev spirochaete were distinct from the other two, from Holland and Berlin respectively. The Kiev spirochetes, however, differed amongst themselves, for four of the strains belonged to three serologically distinct types and in addition two distinct types were obtained from the same source, namely the town water

supply. [The existence of such differences in the water leptospiras suggests that similar serological differences may occur in the parasitic forms.]

E. H.

Bessemans (A.) & Thiry (U.). Les leptospires aquicoles isolés en Flandre orientale et la leptospirose spontanée de la souris. [**Water Leptospiras isolated in Eastern Flanders and Spontaneous Leptospirosis of the Mouse.**]—*C.R. Soc. Biol.* 1930. Feb. 21. Vol. 103. No. 7. pp. 519–521. [3 refs.] [Inst. of Hyg. & Bact., Univ., Ghent.]

Further observations on this infection [*ante*, p. 125] show that it is very pathogenic to mice since all the animals died 5 to 12 months after becoming infected and all showed leptospira in the urine until death. The organisms were obtained in pure culture from the kidneys of these mice, by culturing in either filtered tap-water or in Vervoort's medium containing 10 per cent. rabbit's serum. In the latter medium, inoculated with pieces of infected kidney, the culture showed 30 leptospira per field on the third day, with maximum growth on the fifth day. In filtered water development was only evident after one month, the maximum was reached after two months, and the organisms persisted for three months or longer. Subcultures were easily obtained in Vervoort's medium containing 10 per cent. fresh rabbit or horse serum, or ascitic fluid. If mixed with bacteria the leptospira were easily isolated in pure culture by filtration through a Chamberland L2 porcelain filter.

The leptospira are said to be finer and shorter in the mouse, but become thicker and longer when grown in cultures.

E. H.

Stefanopoulo (G.) & Hosoya (S.). Recherches sur les spirochètes ictérogènes. Les spirochètes du "Akiyami" ou "fièvre d'automne" du Japon. [**Researches on Icterogenic Spirochaetes. The Spirochaetes of Akiyami or "Autumn Fever" in Japan.**]—*Bull. Soc Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 923–937. With 7 figs. (2 on 1 plate). [9 refs.] [Pasteur Inst., & Imperial Inst. for Infectious Diseases, Tokyo.]

A useful summary of previous work on the spirochaetes of "Autumn Fever" in Japan, together with an account of original observations. The authors confirm the view that the spirochaetes obtained from patients infected with this disease belong to two distinct types, *S. autumnalis* A and *S. autumnalis* B, which differ not only in their immunological reactions, but also in their pathogenicity for guineapigs. The spirochaetes of type A are extremely virulent, and closely resemble *Spirochaeta icterohaemorrhagiae*, whilst those of type B have a very low virulence, and closely resemble *S. hebdomadis*. A strain of *S. autumnalis* A, which when first isolated, was feebly agglutinated by an anti-*icterohaemorrhagiae* serum, became much more susceptible to the action of this serum, after having been kept in the laboratory for some months. This observation supports the view that the serological characters of strains of these spirochaetes kept in laboratory animals, are liable to change.

With reference to the treatment of this disease, various drugs were tested in guineapigs infected with *S. autumnalis* A, but the only effective compounds were bismuth salts and especially sodium tartrobismuthate.

E. H.

Kouwenaar (W.) & Wolff (J. W.). Honden als dragers van leptospira. (Voorloopige mededeeling.) [**Dogs as Carriers of Leptospira.**]—*Nederl. Tijdschr. v. Geneesk.* 1930. Jan. 25. 74th Year. 1st Half. No. 4. pp. 376–380. With 1 plate. [16 refs.] [Path. Lab., Medan, Sumatra.]

Two affections of dogs have in recent years been described in which spirochaetes were found in the kidneys. These are "canine typhoid" with uraemic symptoms and "infective jaundice," which closely resembles Weil's disease. The authors have examined 106 dogs, suffering from no apparent disease, for leptospira carriers; some of these might possibly have suffered from a slight infection and become carriers thereafter. The urine, which was examined by dark field illumination, was not once positive. Suspensions of liver examined microscopically and culturally, were all negative. Cultures from kidneys, however, gave a positive result in 6 cases (5·7 per cent.) after 19, 19, 22, 24 and 33 days respectively. The percentage should be somewhat higher than this, for some cultures had to be rejected on account of overgrowth by contaminating organisms. In four out of the six cases spirochaetes were found after a long search in sections of the kidney tissue. They formed large clumps in the renal tubules. The virulence of the isolated strains was low for guineapigs nor was the result of intraperitoneal injection at all like that given by the leptospiras of Weil's disease. These spirochaetes are certainly not absolutely identical with those of Weil's disease. The authors in this preliminary communication simply wish to put on record the occurrence of leptospiras in clinically healthy dogs in a region where comparatively numerous cases of leptospirosis had occurred. The possibility of dogs being a source of infection for man is obviously one to be considered.

W. F. Harvey.

Nieschulz (Otto) & Wawo-Roentoe (F. K.). Over experimenteele infecties van paarden met *Leptospira icterohaemorrhagiae*. [**The Infection of Horses with** *Leptospira icterohaemorrhagiae*.]—*Tijdschr. v. Diergeneesk.* 1930. Mar. 1. Vol. 57. No. 5. pp. 282–289. With 2 text figs. [10 refs.] English summary pp. 290–291.

Two young horses about 5 months old were successfully infected with Weil's disease. The first was inoculated with 12 cc. of a virulent culture and showed a typical infection with the development of lysins and agglutinins against the spirochaete. The second horse was inoculated with 130 cc. of the blood of the first one and died from the infection after 6–7 days, with typical symptoms of jaundice. The spirochaetes were found in the organs, especially the liver, and easily found in the blood and urine of both horses. The first horse became negative on the 13th day, and spirochaetes could not be found in the organs on the 22nd day when it was killed, so apparently recovered horses do not remain carriers of the infection. The serum of this horse showed lysis on the 6th day, which reached a titre of 1 : 100,000 on the 12th day, but had fallen to 1 : 25,000 on the 22nd day.

E. H.

YAWS AND SYPHILIS.

WILSON (Paul W.) & MATHIS (Maurice S.). **Epidemiology and Pathology of Yaws. A Report based on a Study of One Thousand Four Hundred and Twenty-Three Consecutive Cases in Haiti.**—*Jl. Amer. Med. Assoc.* 1930. Apr. 26. Vol. 94. No. 17. pp. 1289–1292.

A short article giving some observations made on patients who visited a travelling clinic operating in an isolated rural area of Haiti in May–July 1929. The opinion is expressed that " yaws is of much less frequent incidence as the altitude of the habitations increases above 2,500 feet,"and it is believed that though greater density of population may be a factor, the chief factor in transmission is a small gnat *Hippelates flavipes*, found in abundance at the lower altitudes, which acts as a contaminative vector. In 67 per cent. the primary lesion was considered to have been on the lower extremity.

The commonest symptom for which relief was sought was rheumatic pain (47 per cent.), next, crab yaw or plantar keratosis (23 per cent.); 7 per cent. only were secondary eruption cases and another 7 per cent. showed primary lesion only ; chronic ulcer (6 per cent.), periostitis and osteitis (5 per cent.) : in under ½ per cent. onychia, dactylitis, saddle-nose, sabre-shin, juxta-articular nodules, gangosa, goundou. In 5 cases a diastolic aortic murmur was heard, in 4 cases hemiplegia was seen, in 4 interstitial keratitis, in 4 mucous patches, in 2 aortic aneurysm, but it is not quite clear whether these cases are considered to have a framboesial etiology.

[Some of these cases appear very doubtful, as do others quoted under the heading " of possible hereditary origin " ; one a female infant aged 14 months with aneurysm of the right carotid, no history or other evidence of yaws in the child but the father had had a primary yaw at the age of 18. A second child had had bilateral ptosis since birth—he had not had yaws, but his mother was infected when 14 years old. A third child, whose father and mother had both had yaws, had pain and swelling in a knee. Other similar cases are cited including a boy aged 13 with Hutchinson teeth, stated never to have had yaws, but whose father had had yaws.]

Treatment adopted consisted of sulpharsphenamin intramuscularly or acetarsone by mouth (three treatments in consecutive weeks for adults, 1 tablet 0·25 gm. in water 4 times a day). Results were satisfactory, but no details are given.

The authors add, as has been reported before from Haiti, that yaws is a rural disease ; anyone with florid yaws is banned from the towns while cases of syphilis go unmolested. They have only seen in many years experience a single case of syphilis in a person with evidence of previous yaws infection and they believe yaws confers an immunity to syphilis. They here state that hemiplegia and aortitis, etc., may be due to yaws, that the disease is occasionally hereditary and that the mucous membrane of mouth and pharynx may be affected.

H. S. Stannus.

CHOISSER (R. M.). **Pathology in the Tropics. A Study based on the Review of 700 Consecutive Autopsies in Haiti.**—*U.S. Nav. Med. Bull.* 1929. July–Oct. Vol. 27. Nos. 3–4. pp. 551–568. With 15 figs. on 8 plates.

A section of this article, based on the findings in 700 necropsies during three years, is devoted to yaws. 90 per cent. of bodies showed signs of treponematosis in the arterial system though yaws-syphilis ranked low as a cause of death. The bodies came from a population which when attending dispensary practice yields 60 per cent. positive serum reactions.

These cases coming to post-mortem examination gave a clinical history of syphilis or yaws in 65 per cent. Disregarding the large proportion in which the history was conflicting on the question of yaws *or* syphilis, the author believed that in 10 there was a definite history of yaws and none of syphilis. Of these 8 were cases of aortic aneurysm, 1 gumma of brain, 1 cerebral haemorrhage. The pathological processes found in these selected cases could not be differentiated from those found in the rest of the 90 per cent. of bodies, cases in which the non-committal diagnosis of trepanematosis was made.

Diagnosis of treponema infection was based on lesions found in the cardio-vascular system, the earliest changes being a degeneration of the intima of the aorta with scarring and associated fatty changes beginning some 5 mm. above the valve and spreading to the transverse portion of the arch, followed later by extensive atheromatous degeneration and in some cases ulceration. In one case of severe "yaws aortitis," the intima and media were detached in long strips. In late yaws aortic aneurysm is not uncommon. Valves are practically never affected. Opalescent patches were noted on epicardium and endocardium while the myocardium was usually thin and flabby, but rarely showed fibrosis.

In the present series of cases there were 4 cases of cerebral haemorrhage all in young adults with a history of yaws.

The liver in cases of old and untreated yaws frequently shows small superficial punctate scars which on section show degeneration and circumscribed round-celled infiltration. A case of gumma of the liver and one of gumma of brain were also seen in cases which had given a negative history of syphilis, but admitted yaws. No case of tabes was observed.

[It is I think just worth while to examine these figures again : 630 (90 per cent.) of the total 700 bodies showed evidence of treponematosis —the evidence being "irregular linear scars and atheromatous plaques" . . . "a degeneration of the intima with resulting scars associated with fatty changes." "extensive atheromatous degeneration," aneurysm. These changes suggest rather those of what in England we call atheroma, a condition beginning in the intima and in which syphilis plays no part. Syphilitic aortitis is a mesaortitis : the essential changes are in the media followed by a fibrosis causing contraction with the production of linear and stellate scars. It is therefore essential, it is suggested, that the author give a more precise and detailed account of the histo-pathological changes in the lesions he has mentioned before yaws and syphilis as etiological factors can be accepted.

Again of the 630 cases only in 10 was the author satisfied that yaws could be asserted as the cause to the exclusion of syphilis and this on the past history. When difficulty existed in 63 out of every 64 cases it is suggested that complete reliance cannot be placed on the history in the odd one case.] H. S. S.

DA MATTA (Alfredo Augusto). Conclusões em torno de 600 casos de bouba. [**Six Hundred Cases of Yaws.**]—*Sciencia Med.* 1929. Dec. Vol. 7. No. 12. pp. 591–603. With 12 figs. on 6 plates. [47 refs.] [Oswaldo Cruz Dispensary & Pasteur Inst., Manaos.]

In his introductory paragraphs Dr. da Matta divides the treponema infections into : (*a*) the treponematosis of the skin and mucous membranes [!]—yaws—a disease of tropical countries—markedly contagious but not hereditary and not giving rise to tertiary lesions, easily treated ; (*b*) the treponematosis of the blood and viscera [skin not mentioned!]—syphilis—world-wide distribution, hereditary, and commonly followed by tertiary lesions, resistant to treatment. Next the history of the introduction into Brazil is mentioned and the etiopathogeny and symptomatology dealt with. While admitting a variety of cutaneous manifestations as due to yaws the author has never seen any of the ulcerative lesions of skin and bone, osteitis, etc., goundou or gangosa commonly ascribed to this disease by many other authors.

H. S. S.

MUKHARJI (B. C.). **Framboesia Tropica in Bengal.**—*Indian Med. Gaz.* 1930. Jan. Vol. 65. No. 1. pp. 10–11.

A disease locally known as *myang* was reported in February, 1927 among natives of the Chittagong Hill Tracts and was later in the year diagnosed as yaws. In discussing this disease the following statements are made :—

" The primary lesions may appear as an ulcer or as a papule, which soon breaks into an ulcer. Primary ulcers have been found on the genitalia but they may be extra-genital . . . The papules appear on the skin and break down, forming ulcers with clean-cut edges and granulating bases. In some cases the papules grow into small warty tumours which break down and form unhealthy looking weeping ulcers with clean cut edges . . . Warty growths have been noticed in the anus."

[Such a description is not that of yaws as commonly seen and it is suggested needs confirmation by someone well acquainted with yaws or some modification in the use of terms. Such a statement as that in relation to the anus is most misleading.] It is believed that the disease was introduced some 15 years ago by Burmese labourers who were engaged in the district in building an elephant trap; hence the word *myang* (=an elephant).

H. S. S.

LAMBERT (S. M.). **Yaws in the South Pacific.**—*Amer. Jl. Trop. Med.* 1929. Nov. Vol. 9. No. 6. pp. 429–437.

The South Pacific differs from most other framboesial centres of the world, the author points out, in that syphilis is almost unknown. He bases this statement upon the fact that apart from a single Fijian who acquired syphilis from an Indian woman he has never seen a primary chancre or the scar resulting from a chancre, among many thousands of natives examined during many years. With the exception of two other cases under special conditions the author says he has never found any medical man in the South Pacific who has seen syphilis among the natives, though the disease is extremely prevalent among the Indian

population in Fiji and Asiatics in other groups. Yaws clinically in the earlier stages runs a course similar to that seen elsewhere, but note is made that among older children and adults certain other lesions are common and accounted for 329 of 1,825 admissions to the Colonial Hospital and 2,167 of 8,819 admissions to provincial hospitals. Among these, a condition is described rather like a rapidly spreading lupus, a multiple gummatous ulceration of skin spreading peripherally while healing in the centre, occurring on face, limbs, back or chest. In others, the ulceration spreads by an advancing raised edge of ulceration. Both varieties also attack the mucous membrane of the nose, palate, pharynx and septum with tissue destruction.

Periosteal thickenings on long bones are also common while nodules like those in the skin are found in the bones, particularly in the sternum and calvarium. Large indurated masses occur in muscles and a nodule was seen in a man's tongue ; these clear up quickly with potassium iodide.

Aneurysm and aortic disease are not uncommon diseases among Fijians. Cases of paraplegia and of persons with signs of cerebral tumour responding to iodides and arsenical compounds are not infrequent. Of 182 admissions to the local asylum, Fijian natives, Melanesian and Polynesian none of whom have had syphilis, 42 have died of G.P.I. [Observations which are similar to those of other writers upon yaws in the South Pacific, but which are not accepted by all those interested in the disease.]

In dealing with treatment Dr. Lambert believes that the reservoir of infection lies among youths who have a history of yaws, but who show no signs or symptoms of the disease, and that an anti-yaws campaign must provide mass treatments of the youth up to the age of seventeen.

H. S. S.

TIROUVANZIAM. Le pian, maladie endémique. [**Endemic Yaws.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1929. June. Vol. 7. No. 6. pp. 317–320. With 1 text fig.

Yaws is widely spread in Cambodia, especially in the forest region. It is considered one of the inevitable diseases of childhood, and the disease in the secondary stage is allowed to run its course for several months before treatment with sulphate of copper is begun. Any further aid is only sought when more disabling lesions occur. These are as met with in other countries and include gangosa, etc.

H. S. S.

LEON (Rulx). **Hereditary Yaws.**—*Amer. Jl. Trop. Med.* 1929. Nov. Vol. 9. No. 6. pp. 439–443. [7 refs.]

Yaws, according to most authorities, has been considered a non-hereditary disease. On the other hand, HUNT and JOHNSTON, in a study of 2,000 cases of yaws in natives of Samoa among whom syphilis is said not to occur, found cases of parenchymatous keratitis and concluded that this affection was due to inherited yaws. The present author therefore thought it would be worth while to apply what he calls " the obstetrical method " in a search for heredo-yaws as is done in searching for heredo-syphilis.

In a series of 225 deliveries systematic search was made in the mothers for the existence of syphilis or yaws, and the possible transmission to the

children. The diagnosis of yaws in the mother rested on her own statement; "in the presence of a positive Kahn reaction, when there is no history of yaws it is usually safe to assume that syphilis exists."

The other factors noted beside the Kahn reaction of mother and child were "presence of hypertrophy of the placenta, abortions, and babies born dead or macerated."

The following table has been made from the figures given by the author.

	No history or evidence of yaws or syphilis.	Cases considered to to be syphilis.	Mothers considered to have positive yaws history.
Mothers	50	124	40
Kahn Test Mother ...	Neg. 98%	Pos. 67%	Pos. 97%
Kahn Test Baby ...	—	,, 60%	,, 50%
Hypertrophy of Placenta	34%	58%	63%
Children born dead...	—	14%	(1 case =) 2·5%
Macerated foetus ...	—	10%	—
Abortion	—	2 cases.	2 cases.

A statement is then made that "Interstitial keratitis was found twice among the children of the syphilitic mothers, but never among the children of yaws mothers. The fetal liver and the placenta was examined histologically in 17 cases without finding spirochaetes." The author finds that by this method of investigation somewhat similar results are obtained in a group of yaws cases as in a group of syphilitic cases. [The fallacies are so obvious that they do not need mention.]

H. S. S.

Wilson (P. W.). **The Frontal Attack on Yaws—a Plea for a Change in Strategy.**—*U.S. Nav. Med. Bull.* 1930. Jan. Vol. 28. No. 1. pp. 1–5.

A short address read before the third annual congress of the Haitian Medical Society in April, 1929, entering a plea for a regular campaign against yaws. Local conditions demand travelling units to do the work and in an editorial note it is stated that a beginning has been made along these lines. As to medicinal treatment the author says: "It is believed that in the treatment of yaws in the infectious stage the bismuth treatment should be abandoned, sulpharsphenamine or stovarsol given in its stead, and a second treatment of stovarsol delivered to the patient which he would be instructed to take a week later."

H. S. S.

Shircore (J. O.). **A Note on Certain Aspects of the Epidemiology and Morbidity of Yaws. With Special Reference to Fat Metabolism.**—*Lancet.* 1930. May 3. pp. 960–961.

Dr. Shircore sums up this note in his last paragraph as follows:—

"It would appear from the above data that low dietetic values, in particular the scarcity of animal protein, and the almost entire absence of fat, milk, calcium, and fat-soluble A, which are intimately associated with

calcium metabolism, are the distinctive factors which play an important part in the morbidity and epidemi logy of yaws. And when yaws obtains a hold on the human organism and is untreated, one might well speculate whether the late tertiary manifestations, the osteoporotic lesions, may not be a result of the breaking down of calcium reserve, by an interference of *S. pertenue* with fat metabolism and the activity of fat-soluble A, in the circumstances mentioned."

H. S. S.

Fox (Howard). **Yaws (Frambesia Tropica) as observed in Haiti.**—*Arch. Dermat. & Syph.* 1929. Dec. Vol. 20. No. 6. pp. 820–833. With 8 text figs. [14 refs.]

Dr. Howard Fox relates his observations on yaws seen while on a visit to Haiti; only a single case, a woman from the West Indies, having been under his care before. On the clinical side there is nothing new to chronicle but two important statements, coming as they do from one well versed in the manifestations of syphilis among negroes, may be quoted. "The characteristic early granulomatous eruption of yaws was unlike any manifestation of syphilis that I had ever seen in negroes" [the reviewer has always tried to maintain this point in spite of the publication of so-called framboesiform syphilides]. No case with involvement of mucous membrane was seen among the yaws cases and "in no case did I see anything resembling the ordinary macular eruption (roseola) of early syphilis." The annular papular syphilide, so common in negroes as to constitute a racial peculiarity, was not seen in these cases of yaws; in only two cases was there a condition in any way bearing resemblance to it. There was no evidence of the disease being congenital. Tissue from two cases of secondary and two cases of tertiary yaws was excised and examined by Dr. W. H. Highman. Recent histological examinations in yaws are so few that his findings and Dr. Fox's comments are quoted below in full.

"Under low power magnification, the striking feature was the enlargement of the papillae, prevailing in all diameters. There was a corresponding modification of the contour of the epidermis. In some places the pegs were wide and long, and in others narrow. They fused, cutting off the papillae as islands. In the epidermis were collections of pus cells (small abscesses). The papillae, whether snared off or not, and the upper half of the corium proper contained an infiltration that was sharply limited below in a roughly horizontal line. Within the confines of the infiltration, the veins were engorged. The collagen fibers in the papillae were separated by edema. High power magnification showed that the epidermis was crusted. Many of the rete cells were vacuolated. There was a tendency to edema in and among the rete cells. A marked tendency to hyperkeratosis was found. The miliary abscesses contained pus cells. The infiltration was composed chiefly of plasma cells less densely grouped in the papillae than in the corium, where they suggested a mosaic inlay. In one section, giant cells were found, in another the vascular changes roughly suggested syphilis, but in all the intima and media were swollen. No productive inflammation, however, was found in the vessels as in syphilis.

"Comment: The changes in the epidermis were merely what is found in all proliferating infective granulomas. Schamberg and Klauder and Schüffner demonstrated *Spirochaeta pertenuis* in the abscesses. Blastomycetes and sporotricha are similarly situated in the respective lesions which they occasion. The infiltration in yaws is characteristic in that it is horizontally delimited below and is a plasmoma. All authors agree on this point except White and Tyzzer, who found no plasma cells. Giant cells

are rare. The vascular changes are unlike those in syphilis. The infiltration is not subdivided into tubercles and is not intimately related to productively inflamed blood vessels, as in syphilis. It lacks the giant cells of tuberculosis, and numerically its plasma cells exceed those of syphilis. Moreover, the plasma cells seem more succulent and larger than those in syphilis.

" Dr. Highman concluded that the lesion of yaws was an edematous verrucous plasmoma."

Skiagraphic examination was made of a case in which there was a sabre like protrusion of the middle of the tibia on which was a large fungating hemispherical swelling of the soft parts.

" A roentgenogram was submitted to Dr. L. T. LeWald and Dr. Gustav Bucky of New York, who stated that the changes in the bone were unusual, but were not, in their opinion, syphilitic. The roentgenogram showed a tumor of the tibia originating from the bone marrow and causing a protrusion of the cortex which was markedly thickened but not interrupted. No proliferative periostitis (calcification) could be detected. The thickened cortex suggested syphilis, but the apparently intact periosteum and the protrusion from the marrow were against this diagnosis."

H. S. S.

MIYAO (Isao). **Yaws Lesions on Mucous Membranes and a Report of Two Cases of Genital Manifestations of Framboesia Tropica ; an Instance of Genital Transmission of Yaws.**—*Philippine Jl. Sci.* 1930. Jan. Vol. 41. No. 1. pp. 13–23. With 7 plates & 1 fig. [7 refs.]

Lieutenant Surgeon Miyao publishes his observations as indicated in the title of this paper because, he states, very little information is given in textbooks upon these points.

In short, a Japanese male suffering from yaws with secondary lesions on the glans penis infected his wife, who developed early lesions about the vulva. [Genital lesions are well recognized though uncommon, and the same is true of genital infection.] The second point, namely yaws lesions on mucous membranes, which the author deals with requires careful consideration. In the man he says " one lesion located in the neighborhood of the left corner of the mouth extended onto the mucous membrane of the lip. . . . Around the anus a wide condylomalike moist lesion covered with oozing lymph and pus was found," etc. There was a lesion on the penis extending on to the prepuce and glans involving the frenulum and the adjacent part of the orifice of the urethra. Later he states," the lesions on the mucous membranes, that is to say, the lip, anus, and glans penis, remained unchanged." [Lieut. Miyao does not appear to recognize that the glans penis is covered with skin not mucous membrane, and that the lesions around the anus are always in connexion with skin, and the same is probably true of those lesions commonly situated at the muco-cutaneous junction of the mouth and nostril. It is possible that secondary framboesial lesions may develop on mucous membranes, but very few such true lesions have been recorded, if any ; those that have been observed have been possibly the result of a creeping lesion from skin on to mucous membrane with healing taking place at the tail end.]

In the case of the woman the two earliest lesions were situated " on right labium majus " followed by others, one " at the introitus of the anterior vaginal wall below the orifice of the urethra . . . one was located between the clitoris and the urethral orifice and one in the neighbourhood of the lesion 2 on the upper part of the right labium majus." Later " one new lesion was found on the posterior wall of the introitus vagina." [These again are alluded to as lesions on mucous membranes, but with the exception

of one they were all certainly situated on the skin of the vulva as indicated by the diagram given. The one possible exception must remain uncertain as the diagram is not sufficiently clear. Most of what has been written in the past on the question of secondary yaws lesions affecting mucous membranes cannot be relied on : many such observations really refer to lesions about muco-cutaneous junctions, and some, as in the present case, depend upon the non-recognition of what is skin and what is mucous membrane. Hence the reason of this long criticism by the reviewer.]

H. S. S.

Miguens (J.). Le pian et son traitement par les sels insolubles de bismuth. [**Yaws and its Treatment by Insoluble Salts of Bismuth.**] —*Ann. Soc. Belge de Méd. Trop.* 1929. Oct. 30. Vol. 9. No. 3. pp. 211–217.

Writing from Bukama, Belgian Congo, the author, whose first communication on the treatment of yaws was made in 1924, now gives some of the results noted 18 months after a form of treatment instituted in 1927 [see this *Bulletin*, Vol. 22, p. 550]. His method consists in giving a single intramuscular injection of a 10 per cent. oily suspension of dermatol in the proportion of 1 cc. (or 0·05 of bismuth metal) per 10 kilogr. body weight. Seen 18 months later, of nearly 1,000 cases so treated, 85 per cent. showed clinical cure. The remaining 15 per cent. he suggests are accounted for by the inclusion in the original number of some old chronic cases, some of which are bismuth-resistant and possibly a few cases of reinfections.

These results prove the value of this form of treatment—single massive doses of insoluble salts of bismuth, though, as the author points out, the results are merely clinical and not controlled by W.R. and the ultimate result is unknown.

[It would be most instructive if this group of cases could be kept under observation during the next few years, or longer if possible, to see if recrudescences or late manifestations do occur, also if a W.R. could be done on each of these apparently cured cases at some future time.]

H. S. S.

Mattlet (G.). Traitement du pian par le dermatol. [**Treatment of Yaws by Dermatol.**]—*Bull. Méd. du Katanga.* 1929. Vol. 6. No. 1. pp. 26–29.

Since this author's first note on the use of dermatol it has been used continuously at Kitega. For florid yaws in the adult N.A.B. may be preferable, but for the cases with rheumatic and bone pain, ulcerative and other late manifestations, the bismuth preparation is better. The product furnished by Meister Lucius and Bruning, containing 50 per cent. bismuth metal, is found to be much safer than commercial dermatol. The approximate weight of the patient in kilos divided by 20 expressed as c. centimetres is the dose of a 3 per cent. oily suspension (prepared after the method of Yernaux) for an adult given intramuscularly at weekly intervals. Latterly, to obviate some of the difficulties and dangers met with when using the oily suspension, tragacanth has been substituted in 5 per cent. solution, to which is added 2–3 per cent. urethane.

H. S. S.

Gold Coast. **On the Use of Bismuth and Arsenic Compounds in the Treatment of Yaws and Syphilis.**—*Gold Coast Rep. on Med. & San. Dept. for Year 1928–1929.* Appendix F. pp. 132–133.

——. **Report on the Yaws Clinic** by Dr. A. J. Hawe, Medical Officer [O'Brien (A. J. R.), Resident Medical Officer].—*Ibid.* Appendix G. pp. 133–138.

In appendix F a summary of opinions by Medical Officers on the relative value of bismuth (sodium bismuth tartrate) and arsenic (N.A.B.) in the treatment of yaws is given [with no statistics]. Bismuth preparations are cheap and easily administered and untoward reactions are uncommon except stomatitis, which responds readily to treatment. Skin lesions of secondary stage respond quickly and patients are rendered non-infective early, but up to twelve weekly injections were needed to produce freedom from symptoms for any length of time, and it is held that bismuth alone is insufficient to " cure " yaws. N.A.B. is considered far superior, but cost is its great disadvantage. [One point, possibly of great importance in regard to effecting actual cure, namely, the length of time the secondary eruption has existed before treatment is commenced, is not referred to.]

Appendix G is a report from the Yaws Clinic dealing with 550 patients treated in the year 1928–29, of whom 81 only completed 3 courses of treatment each of a total 10 grains of " sobita." The results so far as causing the disappearance of the secondary rash were good, but doubt is expressed as to the curative value of bismuth. In tertiary framboesial lesions bismuth was disappointing, but with N.A.B. good results were obtained in ulceration, periostitis and gangosa. Of a total of 81 cases which received at least one course of treatment, the W.R. remained unaltered (positive) in 67·9 per cent., improved in 32·1 per cent., single plus changed to negative 3·7 per cent., double plus changed to negative 4·9 per cent.

H. S. S.

M'Aleer (T. B.). **The Treatment of Yaws with " Bivatol " in Benin, Nigeria.**—*West African Med. Jl.* Lagos. 1930. Jan. Vol. 3. No. 3. pp. 59–61.

A short note on eleven cases treated with Levaditi's bivatol (a bismuth salt in oil). Three intramuscular injections are given in the first week and thereafter two per week, a course being up to fifteen injections to " cure " [? clinical cure]. The results were considered to be satisfactory.

H. S. S.

Puff (Gerhard). Beitrag zur Behandlung der Framboesie. [**Treatment of Yaws.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. July. Vol. 33. No. 7. pp. 388–392. With 1 text fig. [5 refs.]

Working at a Mission hospital among the Wachagga in the Kilimanjaro area, the author describes some of the conditions met with and ascribed to yaws with special reference to treatment by calomel " diasporal " and bismuth " diasporal."* Mention is made of a case

* Prepared by " Firma Chemisches Werk, Dr. Klopfer."

of deep punched-out ulceration of the tonsil and adjoining parts which responded quickly to the former preparation, and a second case of a similar condition affecting the lip cured by calomel diasporal and N.A.B. A monarthritis of knee, ankle, elbow or wrist is common and easily treated by the exhibition of mercury, especially in the form above mentioned. Reference is also made to bone pain as a common symptom and to keratosis of hands and feet, and framboesial affections of the liver and other internal organs the author also suspects to exist, but without any evidence. The statement is made that because the conditions mentioned above do well under mercury and N.A.B. he considers them to be cases of yaws. [One is tempted to think that many of the cases on the contrary may have been syphilis.] The rest of the paper contributes support to the efficacy of the two diasporal preparations in tertiary yaws [or syphilis].

H. S. S.

Todd (K. Waller). **Halarsol and Yaws. Two Further Series of Cases.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Aug. 26. Vol. 23. No. 2. pp. 201–202. [Hosp. of Baptist Missionary Soc., Yakusu, Upper Belgian Congo.]

A previous article by this author and Dr. C. C. Chesterman on the same subject has already received notice in this *Bulletin* [Vol. 25, p. 659]. The evidence obtained in the present series of 69 cases goes to show that a standard treatment of 2 cc. of a 2·5 per cent. solution intravenously repeated once after three or four days "whitens" or yields an apparent clinical cure in secondary yaws in the adult. Weekly doses are effective if repeated for longer periods in tertiary cases. Halarsol is without action when given by mouth. The minimal toxic dose is about 4·5 mgm. per kgm. It has no curative action in trypanosomiasis.

H. S. S.

i. Tanabe (B.). **Note on the Duration of Immunity to Yaws in Philippine Monkeys.**—*Philippine Jl. Sci.* 1929. Sept. Vol. 40. No. 1. pp. 49–51. [4 refs.]

ii. Schöbl (Otto). **Serologic Studies in Experimental Yaws.**—*Ibid.* pp. 53–56. [4 refs.]

iii. —— & Tanabe (Bunshiro). **Experiments concerning the Yaws Antigen which produces Positive Wassermann Reaction when injected in Suitable Experimental Animals.**—*Ibid.* pp. 57–69. With 1 text fig. [6 refs.]

iv. Miyao (Isao). **Is the Wassermann Reaction provoked in Philippine Monkeys by Yaws Vaccination Specific.**—*Ibid.* pp. 71–74.

v. ——. **Following the Subcutaneous Immunization with Yaws Vaccine is the Skin Tissue proper Responsible for the Production of Wassermann Reagin or do Other Tissues also participate?**—*Ibid.* pp. 75–78. [1 ref.]

vi. Garcia (Onofre). **The Relation of the Wassermann and the Kahn Reactions with Regard to Treponema Antigen.**—*Ibid.* pp. 79–87. [2 refs.]

vii. Schöbl (Otto). **Summary of Serologic Studies in Experimental Yaws.**—*Ibid.* pp. 89–90.

viii. —— & Miyao (Isao). **Immunologic Relation between Yaws and Syphilis.**—*Ibid.* pp. 91–109. With 4 plates. [11 refs.]

A series of papers giving the results of further experimental work in yaws carried out by Schöbl and his colleagues at Manila in con-

tinuation of investigations which have already received notice in this *Bulletin*. All those interested in this subject should read the original papers. The seventh (vii), a summary of the six preceding, is given below *in extenso*.

i–vii. " It appears from the experiments described in the preceding papers that the reagin of the Wassermann reaction is a true antibody of its kind. It occurs in the blood not only as a result of infection with treponemas but also as a result of subcutaneous injections of killed treponemas. It is therefore a direct serologic response to the antigen contained in the treponemas and not merely a consequence of interaction between the viable treponemas and the tissues. The ' in vivo antigen ' of the Wassermann reagin is a substance which can be liberated from the treponemas and which shows a high degree of thermostability and is specific. The same ' in vivo antigen ' that produces positive Wassermann reaction is responsible for the appearance of other serologic reactions which are based on the phenomenon of precipitation of the ' in vitro antigen ' by the serum of the tested subject (Kahn). The strength of the Wassermann reaction stands in direct proportion, but the pre-Wassermann period in inverse proportion, to the amount of the treponema antigen injected. The serologic response to repeated vaccination with killed treponemas is the same as the response to repeated infections interrupted by cures.

" Following subcutaneous vaccination the skin proper and not the lymphatic tissues or the muscles are responsible for the production of the antibody detectable by the usual serologic reactions. Intraperitoneal and intramuscular vaccination failed to produce positive serologic reactions. The serologic reactions and the antitreponematous immunity are not directly dependent on each other but are dependent on a common factor, that is the ' in vivo antigen.' Consequently these two phenomena show a certain parallelism. The strength of the Wassermann reaction in the early stage of the disease indicates the severity of the infection at that time, and therefore it indirectly prognosticates the early development of the subsequent immunity. But the immunity continues to exist after the serologic reactions have vanished. However, the infection may be so mild that no appreciable serologic change will take place, and yet immunity may set in even though delayed. If a persistent positive serologic reaction establish itself in the resistant stage of yaws following infection it may last for a long time without any apparent lesion or latent infection."

viii. Schöbl and Miyao deal with the results of experiments devised with the idea of clearing up the question which forms the title of this paper. A great deal of previous work, it is pointed out, for reasons given, is open to criticism. " The study of immunity in syphilis was stranded on the rock of *latent infection*." The main fact in the problem as previously established by Schöbl is that yaws monkeys were only found to be without exception immune to superinfection (with yaws) seven months after the primary inoculation ; in other words, the minimum time limit at which monkeys can be expected to have developed a high degree of immunity to yaws is no less than 210 days. Monkeys therefore, at a twelve months' interval, and proved to be immune to yaws, were used in testing for cross immunity to syphilis, using the Nichol strain. Intradermal inoculation on the brow or scrotum of monkeys with material from syphilitic rabbit orchitis was the method adopted. The inoculation lesion so produced in control monkeys is very small and contains very few treponemata. It develops after 2–(3)–4½ weeks and disappears after a time varying to 12 weeks, leaving no sign. Such a lesion would hardly serve by which to judge of infection. A method was therefore employed whereby at varying intervals after the initial lesion had healed an emulsion of the

corresponding excised lymph glands was injected intratesticularly into rabbits. All 13 yaws-immune monkeys failed to develop syphilis, while all the control non-immune animals were infected, as demonstrated by the above method. It is held, therefore, that a high degree of immunity to yaws protects against cutaneous infection with syphilis in Philippine monkeys. That the treponema of syphilis in monkeys as in rabbits reaches the lymph glands regularly, and survives there long after the inoculation lesion has healed forms, the authors believe, a fundamental biological difference between this infection and yaws and serves as a rational explanation of the clinical differences between the two diseases.

H. S. S.

MIYAO (Isao). **An Unusual Late, Fungoid, and Ulcerative Yaws Lesion in an Experimental Monkey.**—*Philippine Jl. Sci.* 1930. Jan. Vol. 41. No. 1. pp. 25–29. With 3 plates. [1 ref.]

A short note recording the clinical manifestation in an experimentally infected monkey.

1926. Nov. 26, inoculated in both eyebrows from a yaws monkey. Dec. 22, primary yaw developed in each site containing treponemata. 1927, Feb. 7, treatment with neosalvarsan begun, eight injections with a total of 0·09 gram. March 5, after the second injection no sign of lesions remained, and nothing fresh developed.

1928. Feb. 15, reinoculated on both eyebrows from a yaws monkey. April 11th, inoculated a third time nothing having happened since 15.2.28. June 25–July 28, a yaw developed on left eyebrow spreading on to lid and later forming a large fungating mass which in November began to retrogress and show signs of spontaneous healing in December, no treatment having been given. "Throughout the duration of the late lesion weekly examinations were made by dark-field microscope. Treponemas were never found in the lesion."

[No explanation is offered for this clinical course and of the non-finding of the organisms in the lesion.]

H. S. S.

HASHIGUCHI. **Movability of Rabbit Frambesia.**—*Hifuka Kiyo* (*Arch. Dermatology*). 1929. Apr. Vol. 13. No. 4. [Summarized in *Japan Med. World.* 1929. July 15. Vol. 9. No. 7. pp. 237–238.]

"BROWN and PEARCE maintained that there is no secondary keratitis in experimental rabbit frambesia and this point, therefore, can be taken as a differentiating point of frambesia from syphilis. On the other hand, IKEGAMI reported several cases of secondary keratitis and depilation of entire body and he said that there is no clinical distinction between frambesia-keratitis and syphilis. The author compared frambesia and syphilis histologically and clinically. Affection of nose in frambesia is comparatively rare. Only seven cases out of 84 experimented rabbits had secondary affection in nose. The nose is affected in 50 to 248 days after inoculation and reaches its maximum in 10 to 47 days and spontaneously heals in 47 to 127 days. Clinically as well as histologically the site of affection cannot be distinguished from syphilitic affection. It may be only somewhat milder. Spirochaeta pallidula are always found in the site."

H. S. S.

HASHIGUCHI. **Metastatic Changes in Rabbit Frambesia. Specially Clinical and Pathological Studies in Skin Eruptions.**—*Hifuka Kiyo (Arch. Dermatology).* 1929. May. Vol. 13. No. 5. [Summarized in *Japan Med. World.* 1929. Sept. 15. Vol. 9. No. 9. p. 299.]

A note upon the secondary eruptions occurring in rabbits inoculated with yaws. They occur in 9 per cent. of animals and appear in from 40 to 114 days after inoculation, and last 22–52 days. Roseolar, papular and encrusted lesions are met with, with transitional types and desquamation, the desquamatory papular eruptions predominating. The areas affected include head, face, back, buttock, the extremities, external genitalia and tail. The histological picture in the several eruptions is similar, but varies in the degree of evolution. Infiltration with large and small mononuclear, polynuclear, plasma and connective tissue cells and histiocytes is noted, associated with various degrees of hyperaemia and oedema. The spirochaete can be demonstrated in all the eruptions except the roseola. Clinically and histologically the picture differs somewhat from that in syphilis but, it is considered, in degree only.

H.. S. S.

BUTLER (C. S.). **Relation of Syphilis and Yaws.**—*Ann. Internal Med.* 1929. Aug. Vol. 3. (Old Series Vol. 8.) No. 2. pp. 175–179.

In this lecture, delivered to students at Georgetown University Medical School, Captain Butler gives a short survey of the grounds upon which he bases his ideas of the unity of syphilis and yaws. In referring to the history of syphilis he points out how " attempts have been made by the learned . . . . to place the origin of syphilis to the credit of any other race of people than that to which the particular wise man who was doing the writing about it, belonged." It was a long time before the theory that Columbus brought the disease into Europe from the Carib Indians was discredited. Captain Butler's explanation is as follows : " It is our belief that the Portuguese infected the ' Slave-bearing ' fringe of Africa with their venereal type of syphilis and that the 75 years of their contact with this coast through the slave trade before they began sending slaves to America [1442 to 1517] was sufficient to give the negroes Portuguese syphilis. The negroes interpreted the white-man's syphilis in terms of yaws and when the West Indian slave trade began, passed it back to him as such." For the author—" The identity can be proven as far as it is possible to prove anything in medicine by tests and studies old and new, arranged under the following heads, any one of which might occupy from a half minute to a half day depending upon the state of ' openness ' of the particular mind to accept facts," etc. [For Captain Butler the problem is an easy one and settled; others appear to still keep their minds open, waiting for the evidence which experimental work now being carried on in syphilis and yaws will yield.]

H. S. S.

REASONER (Mathew A.). **Experimental Yaws and Syphilis.**—*Amer. Jl. Trop. Med.* 1929. Nov. Vol. 9. No. 6. pp. 413–427. [17 refs.]

Research work commenced upon yaws in rabbits upon similar lines to that carried out with syphilis published in 1916 was interrupted by duties in connexion with the war. It is now published.

It is not possible to give in a summary the conclusions reached, nor perhaps is it necessary at this date; the paper will be read by those interested, and in it will be found in Part II reference to the findings of subsequent workers.

H. S. S.

Walravens (P.) & Walker (J.). Syphilis nerveuse chez le noir. [**Syphilis of the Nervous System in the Black.**]—*Ann. Soc. Belge de Méd. Trop.* 1929. Oct. 30. Vol. 9. No. 3. pp. 203–206. [Bact. Lab., Elisabethville.]

After alluding to the common belief that syphilis of the nervous system is rarely seen among black races the author gives short notes of 5 cases met with in Elisabethville diagnosed as cerebral syphilis, 3 of which were considered to be cases of G.P.I. In all trypanosomiasis was excluded; in all the C.S.F. gave a positive W.R.; albumin and lymphocytes were present.

H. S. S.

Rossow (A. W.). Zur Klinik und Diagnostik der Nodosités juxta-articulaires. [**Symptoms and Diagnosis of J.A.N.**]—*Arch. f. Dermat. u. Syph.* 1929. May 20. Vol. 157. No. 3. pp. 677–684. With 3 text figs. [17 refs.]

Two new cases are described in this article, bringing up the total number mentioned in Russian literature to 20. A short analysis of these 20 cases is then made. It is noted that in 18 evidence of syphilis was positive; the W.R. was positive in 15. In 15 manifestations of syphilis were present at the time the patient came under observation of the J.A.N. The nodules had been noticed for periods varying from 2½ months to 23 years. The elbow and great trochanter were the commonest sites; the number of nodules varied from 1–10. Thirteen cases had had none, the remainder insufficient, antisyphilitic treatment. His own cases are then described by the author in full and the differential diagnosis is discussed.

H. S. S.

i. Welti (Max H.). Ueber Nodositas juxta-articularis. (Nodosité juxta-articulaire Lutz-Jeanselme.) [**Juxta-Articular Nodules.**]—*Arch. f. Dermat. u. Syph.* 1930. Mar. 22. Vol. 159. No. 3. pp. 541–550. With 4 text figs. [2 pages of refs.] [Clinic for Dermat. & Syph., Univ., Vienna.]

ii. Stern (Fr.). Ueber juxtaartikuläre Knotenbildung bei Syphilitikern. —*Dermat. Woch.* 1930. May 17. Vol. 90. No. 20. pp. 677–682. With 4 text figs. [8 refs.] [Municipal Hosp., Nürnberg.]

i. The author describes what he believes to be the first case of J.A.N. recorded in Austria, that of a male aged 70, giving no history of syphilis, from whom two tumour masses in the left buttock had been removed four years previously; a diagnosis of sarcoma cutis had been made and the W.R. had been found to be positive. When seen in 1929 he presented typical J.A.N. about elbows, knees and shins, with a "tubero-serpiginous" syphilide on upper and lower limbs; the W.R.+++. An excised node showed a typical pathological picture—portions injected intratesticularly into a guineapig produced no lesion.

ii. Two cases of J.A.N. are recorded, one in a woman of 53 with ulnar

nodes, a tubero-serpiginous syphilide of skin close by and a +++ W.R., but no history of syphilis ; the other, a male aged 35, who had a primary sore in 1919 at which time the W.R. was negative, no secondary lesions, an efficient course of treatment by mercury and arsenic followed by a negative W.R., in whom nodes appeared about the elbows 4 years ago. The right was the size of a duck's egg, the left of a hazel nut. The histological findings were characteristic ; spirochaetes were not demonstrated.

H. S. S.

ALBERNAZ (Paulo Mangabeira). Contribuição ao estudo do " gundú " o " gundu " no Brasil. [**Goundou in Brazil.**]—*Brasil-Medico.* 1929. Aug. 31. Vol. 43. No. 35. pp. 1040–1049. With 8 text figs. [47 refs.]

An interesting article in which the author, after referring to previously recorded cases in Brazil, describes in detail a case of goundou in a white man, the sixth he believes to be described. [Really, I think, the seventh counting a case recently shown at the Royal Society of Medicine.] The cases previously reported in Brazil referred to four white, four coloured men, two negroes and seven unspecified : eleven were males, thirteen females, and in three the sex was not stated.

The author's case was a male white Brazilian, aged 58, who came under observation in April, 1928, with an eight years' history of a burning sensation in the eye, followed shortly after, by swelling below the inner canthus of the left eye, and later still, loss of smell and inability to breathe properly through the left nostril for about ten months. No history of local trauma. The patient states he was born with signs of " bouba " [*sic*] and that two brothers were born with similar skin manifestations which quickly cleared up. His father was said to have suffered from bouba with skin lesions, similar to those in the children. The man has seven healthy children, his wife had no miscarriages, and he himself shows no sign of syphilis. The patient shows right and left paranasal swellings arising in connexion with the nasal processes of the maxillae, and a third swelling associated with the outer aspect of the left malar bone. No other bones were obviously affected, but examination of the nasal passages showed involvement of bony nasal septum and of the arch of the palate forming the floor of the left nostril. X-ray examination confirmed these findings and excluded any lesion of the vault or base of the skull or of mandible. The W.R. is stated to be " strongly negative ++++; Meinicke reaction definitely positive +++ " [I think the word negative is a mistake, as elsewhere reference is made to " a positive W.R. with four + ".] The blood was normal, save for a mild leucopenia with relative lymphocytosis ; the urine normal ; in the faeces a few ankylostome ova.

Four pieces of tissue were excised and submitted to histological examination, the results being described in detail too long to be summarized except to say that they are considered by the author to represent an osteometaplasia, with no sign of any inflammatory reaction, a condition which perhaps cannot be distinguished from Leontiasis ossium, and one having relationships with Paget's disease, osteitis deformans and with Recklinghausen's osteitis fibrosa. [No mention is made of the conditions analogous to goundou described in apes and Andrew BALFOUR'S pony.] The etiology is discussed at some length in connexion with the above-mentioned affections and syphilis as a cause discounted, the therapeutic test having failed in this case (N.A.B., K.I., bismuth). A useful bibliography concludes the paper.

H. S. S.

Mouquet (A.). Ostéite hypertrophique rappelant le goundou chez un *Cercocebus aethiops* vivant. [**Hypertrophic Osteitis recalling Goundou in a Cercocebus.**]—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 918–922.

A report upon a *Cercocebus aethiops* monkey from the Ivory Coast which on arrival in Paris exhibited the condition which has now been described as "Goundou of Monkeys," associated with some bony thickening of the bones of the forearm near the wrist, of the lower end of each femur and the upper end of each tibia. In regard to etiology the author suggests that the disease is one associated with captivity and resembling osteomalacia. The blood was normal. The clinical pictures in this living monkey were compared with those in a cynocephalus skeleton.

H. S. S.

CLIMATIC BUBO.

Lillie (R. D.). **Inguinal Lymphadenitis with Special Reference to the Group known as Climatic Bubo.**—*Arch. Pathology.* 1929. July. Vol. 8. No. 1. pp. 19–37. With 4 text figs. [10 refs.] [Hyg. Lab., U.S. Public Health Service, Washington.]

After referring to the descriptions given by other writers of the histopathology in climatic bubo the author, working in the U.S. Public Health Service laboratory at Washington, sets out notes on some twenty-nine cases of inguinal adenitis from which glands were removed and submitted to him for microscopical examination. Histologically, he found that the cases fell into two groups. Seventeen presented a pathological picture corresponding to that of climatic bubo given by previous authors.

"Summarizing, the first group showed primarily foci of reticulo-endothelial proliferation with central nuclear fragmentation and necrosis, central infiltration with polymorphonuclears or definite formation of abscesses and later homogenization of the contents. In addition, small hemorrhages were frequent. Capillary thickening was common. Often the germinal centers and lymph sinuses were obliterated. Perhaps the most characteristic feature was the occurrence of considerable areas of dense infiltration with plasma cells, pure, or mixed with proliferating fibroblasts and areas of fibrosis. Regularly also there was well marked periadenitis with infiltration with plasma cells, vascular thickening and fibrosis.

"Neither bacteria nor cell inclusions from the nuclear débris in the focal lesions in any of the cases of this group could be identified with certainty."

The remaining cases presented "no especial characteristics to differentiate them from cases of ordinary lymphadenitis." In his conclusion he says, "Climatic bubo is not a clinicopathologic entity. . . . . Climatic bubo, while probably commoner in the tropics, is not restricted to this geographic area."

[The cases were admitted to various hospitals for sailors; they were all cases of seafaring men and one understands that the author conducted pathological examinations only and was not responsible for the clinical diagnoses, which in a large proportion of cases was that of climatic bubo. In reading through the clinical notes and histories in the case reports it might be suggested that the diagnosis in a certain proportion should have been "climatic bubo (?)." In many of these the subsequent

pathological investigation negatived these queried diagnoses. This suggestion is, I think, warranted in view of lack of precise history in many of the cases. With greater precision in clinical diagnosis, in fact, the opposite conclusion might have been reached, namely, that climatic bubo is a clinico-pathological entity. In many cases there is no history as to the exposure to infection and the presence or absence of an initial lesion is only mentioned twice. There is another point to which allusion is not made, and that is the evolution of the pathological changes in the affected glands, a common omission in dealing with the pathology of a disease. The pathological picture may vary very greatly according to the age, stage and degree of acuteness of the process being studied. In this series in which glands were submitted to microscopical examination excision was the only method of treatment adopted.]

H. S. Stannus.

Ruge (Heinrich). Beitrag zur Klinik der sog. klimatischen Bubonen (105 Fälle). [**105 Cases of Climatic Bubo.**]—*Dermat. Woch.* 1930. Jan. 4. Vol. 90. No. 1. pp. 1–11. With 4 text figs. [Inst. for Ship & Trop. Diseases, Hamburg.]

Writing from the Tropical Diseases Institute, Hamburg, the author gives an analysis of 105 cases of climatic bubo, time and place of infection, incubation period, etc., with notes on clinical manifestations and blood findings. Young adults among white races were almost exclusively seen and in 4/5 of the cases there was a history of sexual contagion. The increasing number recognized each year is remarked. Clinically, the affection is not difficult to recognize and Frei's skin reaction is very useful. Gland excision is the treatment advocated. The author would retain the name climatic bubo for all cases, tropical and non-tropical, rather than use the term lymphogranuloma inguinale.

H. S. S.

Semeraro (Arnaldo). Adeniti climatiche. [**Climatic Adenitis.**]—*Arch. Ital. Sci. Med. Colon.* 1929. Nov. 1. Vol. 10. No. 11. pp. 520–529. With 1 coloured fig. English summary p. 529. [Inst. of Trop. Path., Univ., Bologna.]

The condition described, though spoken of as climatic bubo or subacute lymphogranulomatosis, differs in certain respects from what we are accustomed to regard as such in English textbooks. Thus, the most frequent site was the axilla, though inguinal, cervical, and epitrochlear adenitis did occur; males and females were equally affected, and all ages from infants of a few months to adults; the glands often suppurated and the condition "occurred in epidemic form, several members of a family being attacked with adenitis nearly always ending in suppuration." Cultural attempts gave negative results, but complement fixation was positive, the pus being used as antigen. The same, diluted one in five with normal saline and injected in a dose of 0·1 cc., gave a positive intradermal reaction in all cases, it is claimed.

H. Harold Scott.

Hermans (E. H.). **Lymphogranuloma inguinale.***—*Beihefte z. Arch. f. Schiffs- u. Trop. -Hyg.* 1929. Vol. 33. No. 3. pp. 214–218 (298–302). With 1 text fig.

This paper is a short discussion upon some points in connexion with lymphogranuloma inguinale. The author has confirmed the work of others in finding that cases of climatic bubo from West Africa and from North Russia where the temperature is 30° below zero all give positive cuti-reactions with Frei's antigen [see this *Bulletin*, Vol. 25, pp. 18 and 666]. Treatment by inoculation with antigen (0·2, 0·4, 0·6 cc. subcutaneously every four days) has given promising results. The reaction is sometimes very marked, and it is in these cases the best therapeutic effect is seen. [It is quite possible, if not probable, that such treatment is of the nature of a non-specific protein shock therapy rather than a specific effect.] In three of the fifteen cases under the author's care the cuti-reaction was negative, but in one of them an auto-antigen gave a positive reaction (this he calls L.G. antigen 2), and this antigen gave a positive in one of the other cases suggesting that there is a group. Frei observed a similar case.

The author then goes on to deal with the condition variously called syphiloma anorectal or esthiome or ulcus vulvae chronicum elephantiasticum and described by Fournier, Koch, Fabry and Jersild. Syphilis, tuberculosis, gonorrhoea and ulcus molle have been suggested as causes and von Roegholt, who has seen a good deal of this disease in the Dutch East Indies, upholds the last mentioned, as also Joachimovits. Frei and Koppel, however, in all of five cases, obtained positive skin reaction with a L.G. antigen [see this *Bulletin*, Vol. 26, p. 861]. Hermans, in a single typical case under his care, obtained a similar result—positive in the patient with a L.G. antigen which gave negative reactions in controls and the patient was negative to an ulcus molle antigen, thus confirming Frei and Koppel. It appears, therefore, that this second condition seen in women has an etiological relationship to climatic bubo or lymphogranuloma inguinale seen in men.

H. S. S.

Thomsen (Oluf). Ein Vergleich zwischen den bei Lymphogranuloma inguinale und bei Dubois' Thymusabszess bei angeborener Syphilis wahrgenommenen histologischen Veränderungen. [**Comparison between Histological Changes in Lymphogranuloma Inguinale and Dubois' Thymus Abscess in Congenital Syphilis.**]—*Acta Path. et Microb. Scandinavica.* 1929. Vol. 6. No. 4. pp. 379–382. With 2 plates. [2 refs.]

The author's attention was attracted to the histological resemblance between the lymphatic glands in climatic bubo and the so-called Dubois' thymus abscess of congenital syphilis. The well-known picture of the findings in the first condition is closely reproduced in the second as shown by two plates and is discussed in some detail. The cause of climatic bubo is unknown and the author hazards the idea that in Dubois' abscess of the thymus possibly the same cause is at work though it would be necessary to postulate transmission through the maternal germ.

H. S. S.

* Lymphogranuloma inguinale seems an unfortunate term for Climatic bubo, suggesting as it does the totally different condition, Granuloma inguinale or granuloma venereum.

Hellerström (Sven). Lymphogranuloma inguinale und strumöse Bubonen. [**Lymphogranuloma inguinale and Strumous Bubos.**]—*Klin. Woch.* 1930. Feb. 22. Vol. 9. No. 8. pp. 349–351. With 1 text fig. [14 refs.] [Karoline Inst., Stockholm.]

A discussion of the differential diagnosis of lymphogranuloma inguinale, as yet by no means certain in all cases. It is urged that serum and skin reaction be carried out in all cases showing buboes, to detect mixed infections. Reference is made to the similarity in the pathological picture found in Dubois' abscess of the thymus in congenital syphilis and the suggestion that all the changes found in lymphogranuloma inguinale could be produced by that disease. It might, however, be suggested that the converse is true, that Dubois' abscess is due to an infection with the unknown virus of lymphogranuloma inguinale in the congenital syphilitic child. The name strumous bubo may cover several conditions, but that typically met with in children secondary to a tuberculous lesion of the skin should be definitely distinguished from lymphogranuloma inguinale.

H. S. S.

Hoeppli (R.). Ueber die Histopathologie der klimatischen Bubonen. [**Minute Pathology of Climatic Bubo.**]—*Dermat. Woch.* 1930. Mar. 1. Vol. 90. No. 9. pp. 305–314. With 5 text figs. [8 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

——. Zur pathologischen Anatomie der klimatischen Bubonen. [**Pathological Anatomy of Climatic Bubo.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 219–223 (303–307). With 4 text figs. [1 ref.] [Inst. for Ship & Trop. Diseases, Hamburg.]

The author gives short notes of 36 cases, and then discusses his pathological findings. Swelling of glands is moderate and characteristically small abscesses occur; areas of necrosis are small; connective tissue changes are rapid with only a minor degree of granulation formation; there is degeneration of vessel walls; eosinophilia and giant cell formation are present with replacement of lymphocytes by larger cells of different origin and plasma cells. The histological picture is uniform and if not actually specific is, at all events, characteristic.

H. S. S.

Frei (Wilhelm). Weitere Beiträge zur Kenntnis der Lymphogranulomatosis inguinalis und des Ulcus chronicum elephantiasticum vulvae et ani. [**Further Contributions to the Knowledge of Lymphogranuloma Inguinale and Ulcus chr. elephant. vulvae et ani.**]—*Klin. Woch.* 1929. Oct. 29. Vol. 8. No. 44. pp. 2038–2042. [18 refs.] [Skin Clinic, Univ., Breslau & Municipal Hosp., Berlin-Spandau.]

The author's conclusions are as follows: The skin reaction in climatic bubo is specific and not given by cases of ulcus molle; a negative reaction is not so certainly of value in diagnosis. That a bubo due to ulcus molle can resemble the picture of climatic bubo has never been shown. Much less likely is it that confusion could arise

between ulcus molle and chronic ulcerative elephantiasis of the vulva and anus. Thirteen cases of this latter condition with positive L.–I. reaction are now on record and it seems that L.–I. can without clinical manifestations give rise to a lymph gland condition conforming with chronic ulcerative elephantiasis.

H. S. S.

Frei (Wilhelm). Eine noch wenig bekannte, auch in Berlin vorkommende Geschlechtskrankheit, die Lymphogranulomatosis inguinalis, ihre Folgeerscheinungen und ihre Bekämpfung. [**Lymphogranuloma inguinale, a Little-known Venereal Disease occurring in Berlin.**]—*Med. Klin.* 1930. Feb. 28. Vol. 26. No. 9. pp. 305–307. [Municipal Hosp., Berlin-Spandau.]

A paper read before the Berlin Medical Society giving a general account of climatic bubo, its diagnosis and treatment. The author points out how necessary it is for every practitioner to be on the look out for these cases which of recent years are more frequently seen in Europe.

Under treatment, surgical intervention and the exhibition of antimony in some form are the only methods discussed and no mentionis made of the use of T.A.B. vaccine.

H. S. S.

Hellerström (Sven). Ueber die Differenzialdiagnose zwischen Lymphogranuloma inguinale und anderen Bubonenformen. [**Differential Diagnosis of Lymphogranuloma Inguinale and Other Buboes.**] *Acta Path. et Microb. Scandinavica.* 1930. Supplement V. pp. 77–79.

The opening of a discussion emphasizing the difficulties of making a diagnosis between L.I. and other inguinal buboes whether of tuberculous origin, due to syphilis, gonorrhea, ulcus molle, or merely pus infections. The clinical features are unreliable and the histopathological pictures confusing in many cases. Recourse must be had to all aids in differentiation including the Frei and Ito intracutaneous reactions.

H. S. S.

Gracey (D. Ivan). **Climatic Bubo.**—*Malayan Med. Jl.* 1929. Dec. Vol. 4. No. 4. pp. 142–143. [1 ref.]

A note confirming the excellent results obtained by treating climatic bubo by means of intravenous T.A.B. vaccine as advocated by Hanschell. The method was used in "a large number of patients at the General and District Hospitals, Penang."

H. S. S.

Koppel (Alice). Lymphogranuloma inguinale und seine Beziehungen zum Syphilôme anorectal. [**Lymphogranuloma inguinale and its Relations to Anorectal Syphiloma.**]—*Klin. Woch.* 1929. July. 2. Vol. 8. No. 27. p. 1263.

The author alludes to a previous article by herself and Frei on the subject, in which they expressed the belief that there often appeared to be a syphilitic factor involved in the production of this condition as well as lympho-granuloma. In the two further cases now described, however, syphilis was excluded.

H. S. S.

PLAGUE.

FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE. TRANSACTIONS OF THE SEVENTH CONGRESS, BRITISH INDIA, 1927. Vol. 2. pp. 1–130. [**11 papers on Plague.**]

The papers on plague which were read at this Congress consisted, in general, of reviews of various aspects of the subject, and contained little that has not already received attention in the *Bulletin.* The contribution by NAIDU and JUNG on Haffkine's plague prophylactic gives a full account of the methods in use at the Haffkine Institute in Bombay for its preparation and standardization. Technical details which should interest those engaged in similar work include the choice of a highly virulent culture for the production of the vaccine ; the employment of *M. rattus* from Madras, weighing from 65 to 80 grammes, as the test animal ; the lack of relation between the degree of alkalinity of the finished product and its potency ; and the suggestion that a relation may exist between the " roughness " and " smoothness " of the culture and the efficiency of the vaccine prepared from it : a preponderance of " rough " colonies is apparently associated with diminished potency.

In this paper there will be found a table which summarizes observations on the susceptibility of Bombay rats to experimental infections with plague, which were made from June, 1924 to October, 1927. Altogether, 2,450 rats were tested, and on the average about 75 per cent. survived. When the Plague Research Commission were working on the experimental transmission of plague by the rat-flea in1905–06 they found that about 40 per cent. of the Bombay rats were unaffected by the cutaneous inoculation of small doses of a plague culture. It thus appears that in the interval of 20 years the immunity of the rat population in Bombay has significantly increased, and that the enhanced immunity is probably an important cause of the relative freedom from plague which the human population now enjoys. These data constitute apparently the best evidence that has so far been obtained in explanation of the natural decline of epizootic and epidemic plague.

A paper by NAIDU and AVARI on the treatment of bubonic plague in India gives a useful summary of the methods that have been tried. The multiplicity of these methods is doubtless correlated with the severity of the infection as indicated by the high death-rate and with the difficulty of checking the growth of the plague bacillus in the tissues and of neutralizing its specific toxin when liberated at the sites of bacillary deposits. Apart from appropriate surgical and medicinal treatment, special methods have proved of little avail. These include the use of so-called chemo-therapeutic substances (carbolic acid, formalin, salvarsan, eusol, mercurochrome and iodine) ; specific vaccine therapy ; and the administration of bacteriophage.

A commentary by D'HERELLE on the failure of " phage " to control the infection in Indian patients is incorporated in this article. He concludes that the material employed was not sufficiently potent to deal with the strains of *B. pestis* in India, which, in his opinion, are extraordinarily virulent. He states that in a closely allied disease,

namely, haemorrhagic septicaemia in buffaloes, a single injection of from 30 to 40 cc. of a very potent "phage," capable of producing complete lysis within 3 hours, resulted in prompt recovery, whereas natural recovery never occurs in this disease.

NAIDU and AVARI give an analysis of the action of specific sera for plague in man, and conclude that, although serum treatment ameliorates the symptoms, the degree of improvement is not such as to lower appreciably the mortality rate.

A paper on the same subject by Dr. P. T. PATEL, who is medical superintendent of the Arthur Road and the Maratha Plague Hospital in Bombay, is on similar lines and reaches similar conclusions. Dr. Patel rightly urges the necessity for the administration of the serum in sufficient dosage at the earliest possible moment and, in severe cases, by the intravenous route. He writes: "In my experience the specific antitoxic serum in plague is as necessary a part of the treatment as is diphtheria antitoxin in diphtheria." In the reviewer's opinion the question of serum-therapy in plague is likely to remain in an unsatisfactory state until research has indicated the essential components in plague serum, whether antitoxic or antibacterial, and how they may be titrated in terms of a standard unit.

In the discussion which followed PATEL stated that during the last 6 years he had not seen a single case of primary pneumonic plague in Bombay, but that during this period secondary plague pneumonia was recognized in 12 or 13 per cent. of 800 bubonic cases. Lt.-Col. J. TAYLOR, I.M.S., stated that his experience in Bombay and elsewhere was in agreement with the observations of Dr. PATEL.

G. F. Petrie.

SYMES (C. B.). **Note on the Epidemicity of Plague.**—*Kenya & East African Med. Jl.* 1930. Mar. Vol. 6. No. 12. pp. 346–357. With 1 fig.

The evidence upon which the author founds his opinions is taken from the medical reports of Kenya and other territories, 13 in all. The amount of plague in man and rodents is given year by year—7 to 14 years according to the available records. These details cannot be given or condensed. A chart is also given. There is at least a suggestion that in this part of Africa a plague periodicity occurs in areas to which the disease has once been introduced. There is ample evidence, mostly from South Africa, that plague persists in African wild rodents. Gerbilles are particularly guilty in S. Africa, a species of *Arvicanthis* in Kenya. The author further concludes that: (1) The epidemicities of African and Indian plague as shown by present records are very dissimilar; and (4) that until a study of wild rodents is made over a representative area there will be no answer to the following questions: (*a*) Why has Sierra Leone remained entirely free from plague? (*b*) Why are locations along the Kenya-Uganda border, in the Singida district of Tanganyika, and North Nyasa district of Nyasaland, and several other places in East and West Africa apparently permanent endemic centres? (*c*) Why in a district such as South Kavirondo in Kenya with a population of some 300,000, does plague appear in perhaps half-a-dozen

widely separated districts almost simultaneously, and yet never assume epidemic proportions ?

J. H. Tull Walsh.

Doorenbos (W.). Onderzoekingen over de pathogenesis der pest. [**Examination of the Question of Pathogenicity in Plague.**]—*Nederl. Tijdschr. v.' Geneesk.* 1930. Feb. 22. 74th Year. 1st Half. No. 8. pp. 880–893. [Refs. in footnotes.]

In this article the author goes over the possible explanations of the variability of plague pathogenicity in animals and man. Some experiments are given in support of the ideas promulgated. He invokes, as has been done in the case of cholera, the action of other organisms and particularly intestinal organisms of *Bact. coli* and *Proteus* type, in interpretation of plague pathogenicity in certain cases. The intestinal flora of laboratory animals at certain times of the year may be in a state of potential activity. With a plague infection superadded the resulting epizootic may be of a severe type. The severity is not explainable by virulence of the plague organism alone and so it may be that we have here a case of " symbiotic intoxication " or " commensal infection." His argument with regard to one form of bacteriophage action is somewhat novel. Plague bacilli in association with plague bacteriophage may, when fed to a rat, afford a culture from the blood of the animal of plague bacillus together with plague bacteriophage. The action of a plague bacteriophage under natural conditions may not so much be to dissolve the plague bacillus as to convert it into the equivalent of a vaccine or an organism of little virulence. The flea which ingests the blood of a rat containing plague bacilli of low virulence along with bacteriophage may then become a transmitter of the combination ; become in fact a " *vaccine centre,*" in as much as the rats to which it transmits may suffer only from a light form of infection and develop actual immunity. This and other such points of plague pathogenesis are raised in this exposition, not so much to be finally answered, as to indicate lines along which work is taking place.

W. F. Harvey.

Nigeria. **Annual Report on Plague in Nigeria, 1928** [Bell (W. J.), Senior San. Officer].—*Ann. Med. & San. Rep. Nigeria, 1928.* Appendix F. pp. 99–118. With 2 folding maps & 2 folding charts.

This is an official report giving the statistics of plague in and around Lagos ; also the numbers of rodents examined. Of these, 29 infected rodents were found among 81,492 examined. Particular attention is paid to the incinerators of refuse, covering of food, cutting the bush well back from dwellings, proper storage of material likely to give cover to rodents, sealing cracks in walls and floors and proper conduct and cleanliness of slaughter houses. It is remarkable that human and rodent plague should have apparently disappeared from the mainland at a time when this area has been constantly exposed to infection from one of the worst years of epidemic in Lagos.

J. H. T. W.

Schwetz (J.), Fornara (L.) & Collart (A.). La peste dans la région du Lac Albert (Congo Belge). [**Plague near Lake Albert, Belgian Congo.**]—*Ann. Soc. Belge de Méd. Trop.* 1929. Oct. 30. Vol. 9. No. 3. pp. 219–263. With 4 maps (1 folding) & 11 figs. on 8 plates. [10 refs.] [Parasit. Lab., Stanleyville.]

This is the report of a mission sent to investigate plague in the region of Lake Albert. The authors begin with the geography of the region around Lake Albert and with a short description of the lake itself, the villages and population. The various rodents captured and their fleas are tabulated. The most common of the rodents were *Mastomys ugandae* and *Arvicanthis abyssinicus* with *Xenopsylla brasiliensis* and *Dynopsyllus lupusus* as flea parasites. These two animals are seen in one of the several good photographs which appear in the report. The cases of plague seen in various villages are given in tabular form. All forms of plague—bubonic, septicaemic and pneumonic—were found. A programme for prevention was arranged by the Mission.

J. H. T. W.

Strickland (C.) & Roy (D. N.). **Calcutta Rat Fleas. A Contribution to the Epidemiology of Plague in India.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Mar. 17. Vol. 23. No. 5. pp. 497–502. [11 refs.] [School of Trop. Med., Calcutta.]

The authors state that scanty attention has hitherto been given to the rat fleas of Bengal. The work here recorded shows the prevalence and distribution of *X. cheopis* and *X. astia* for a whole year, December 1925 to December 1926. *Ctenocephalus felis orientis* was also found in small numbers for the first time. The figures given show that in Calcutta *astia* is the predominant flea and that, following the opinions of Hirst & Cragg, the absence of severe epidemics there conforms to the rule. The differentiation of specific flea rates on the different species of rats was :—

X. cheopis per 100 rats :—*M. decumanus* 85 ; *N. bengalensis* 117 ; *M. rattus* (4/7).

X. astia per 100 rats :—*M. decumanus* 251 ; *N. bengalensis* 235 ; *M. rattus* (4/9).

J. H. T. W.

Webster (W. J.) & Chitre (G. D.). **Observations on Rat-Fleas and the Transmission of Plague. Part I.**—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 699–709. [4 refs.] [Haffkine Inst., Bombay.]

The League of Nations Committee which met in Calcutta in December 1927 proposed for future study " Investigation of the comparative epidemiological rôle of the various species of fleas in plague transmission in selected areas of India." Experimental work has been carried on by the authors of this paper during 1928–29, in Bombay, with *X. cheopis*, *X. astia* and *X. brasiliensis* found locally. Clean laboratory-bred fleas were used and a simple method of raising families of rat fleas is described. Both *cheopis* and *astia* have been found capable of keeping up epizoötic plague under very favourable experimental conditions in the Bombay hot weather. Successful trans-

mission by *X. brasiliensis* is recorded. A note on the longevity of fleas fed entirely on human blood is appended :—

Rat-Fleas fed from Birth on Human Blood only.

Number of Experiment.	Date of Birth of Flea.	Species.	Sex.	Length of Life in Days.	Feeds offered.	Feeds accepted.
B22	4–9–28	*X. cheopis*	Female	162	136	42
B23	5–9–28	*X. cheopis*	Male	63	53	28
B34	18–10–28	*X. astia*	Female	53	47	13
B42	5–11–28	*X. brasiliensis*	Female	127	57	31
B33	18–10–28	*X. brasiliensis*	Male	68	60	29

J. H. T. W.

Phipson (E. S.). Sur l'épidémie de peste d'Aden de 1928. [**Plague in Aden.**]—*Bull. Office Internat. d'Hyg. Publique.* 1930. Feb. Vol. 22. No. 2. pp. 266–268. [1 ref.]

The only special point in this paper is connected with the introduction of the infection. The author says that infected rats cannot reach the shore, because ships anchor well away from the shore ; but that in all epidemics of plague the disease begins among the coolie population employed on and about the ships. He concludes that the disease is introduced into Aden by man with or without the co-operation of infected fleas. A table is given showing the undoubted value of anti-plague inoculation.

J. H. T. W.

Kurauchi (K.). **Epidemiology of Plague in Inner Mongolia. Plague Studies I.**—*Jl. Oriental Med.* 1930. Apr. Vol. 12. No. 4. pp. 33–34. [Hyg. Inst., S. Manchuria Rly. Co., Dairen.]

As there is no word for plague in Inner Mongolia, it is thought that the disease was introduced some ten years ago, probably from Transbaikalia or Outer Mongolia, where tarabagan pest prevails. While previous epidemics are mentioned, the author deals chiefly with the outbreak in 1928 in three separate localities. In Chien-Chia-Tien one-third of the inhabitants—378 persons—died in three months. Five thousand rats were examined, but no case of plague was found among them. The author thinks that the disease would seem to spread from man to man and also from hamlet to hamlet ; but he is of opinion that the suslik is responsible for plague epidemics in Inner Mongolia.

J. H. T. W.

Thiroux (A.). Recherches sur les causes de l'existence de la peste pulmonaire dans les régions froides ou tempérées et de son absence dans les zones à température élevée, à Madagascar. [**Pneumonic Plague Present in Cold Regions and Absent in Zones of High Temperature in Madagascar.**]—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 704–711.

As the result of his investigations during 1927 and 1928, the author states that the only factor which need be considered in this matter of

the absence of pulmonary plague in the hot regions of Madagascar, while it exists on the colder plateaux, is that of minimum temperature. No epidemic of pulmonary plague has been observed in Madagascar in regions where the absolute minimum temperature is not below 16° C.

J. H. T. W.

Boyé. Les relations entre la peste pulmonaire et la température. [**Relation between Pneumonic Plague and the Temperature.**]—*Bull. Office Internat. d' Hyg. Publique.* 1930. Feb. Vol. 22. No. 2. pp. 274–276.

This note refers to the distribution of pulmonary plague in Madagascar and gives the conclusions found after observation. (1) Pulmonary plague may occur on the plateaux regions at any time of the year. (2) Cases of pulmonary plague have a maximum of frequence whenever the temperature descends below 14° C. (4) When the general temperature is above 16° cases of pneumonic plague are not seen.

J. H. T. W.

Tsuchiya (K.) & Chuan (Li Te). **Report on Natural Recovery from Bubonic Plague.**—*Jl. Oriental Med.* 1929. Sept. Vol. 11. No. 3. pp. 85–90. [8 refs.] [Hyg. Inst., S. Manchuria Rly. Co., Dairen.]

The authors report about 10 cases of natural recovery from bubonic plague found among 378 cases at Chian-Chia-Tieu, Inner Mongolia, from September to November 1928. The authors began to investigate the epidemic on October 24th. Cases were found recovering, but showing signs of an attack. Positive results were obtained from the blood of three of these cases by agglutination and by precipitation tests. These cases had not received serological or surgical treatment and the blood was taken 4 or 5 weeks after infection.

J. H. T. W.

Lefrou (G.). La peste à vomissements noirs. [**Plague with Black Vomit.**] —*Bull. Soc. Path. Exot.* 1930. Jan. 8. Vol. 23. No. 1. pp. 102–103. [1 ref.]

The author records two cases of plague with black vomit which occurred during an epidemic in Saint-Louis. The first was a native soldier who died suddenly in hospital with fever and a small inguinal bubo. Smears from the liver showed Yersin's bacillus in abundance. The black liquid removed contained much blood and also showed plague bacilli. The second case was that of a native boy, 15 years of age, who while being removed from his home had a serious attack of " black vomit." He died on arrival at the hospital. He suffered from fever, headache and a small inguinal swelling. The liver showed abundant plague bacilli.

J. H. T. W.

Schut (J.). Weitere Versuche mit Omnadin bei Lungenpest in dem Tengger (Java). [**Further Trials of "Omnadin" in Pneumonic Plague in Java.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Apr. Vol. 34. No. 4. pp. 223–227.

——. Verdere proefnemingen met Omnadin bij Longpest in den Tengger (Java).—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1930. Apr. 1. Vol. 70. No. 4. pp. 314–321.

"Omnadin" is issued by the Bayer Products, Ltd., and is stated to be "Compound Sarcine vaccine containing the three great reactivitating groups: albumins, lipoids and fats," useful for all infections accompanied by sepsis and high temperature. During 1927, 1928 and 1929 the author has endeavoured to control pneumonic plague outbreaks by injecting "Omnadin" into all contacts as soon as possible. He describes cases of pneumonic plague which died in November, 1927, between the 19th and 22nd. On the 21st the family were isolated, in all, 11 persons. One died on the 22nd. The "Omnadin" treatment of all contacts began on the 24th. Of these 11 persons two died, in spite of the "Omnadin" injections—dose 2 cc.—but the others escaped. Previous to the "Omnadin" treatment four deaths had occurred among this group and the plague bacillus was found in the lungs. In March, 1928, two members of a family died, a girl (showing no bubo) and her mother, in whom buboes appeared in the neck just before death. *Past. pestis* was found in the lungs, but, without waiting for the laboratory diagnosis, the author gave "Omnadin" injections to six contacts dwelling in the house. They all remained healthy. In 1929 the author had a somewhat similar experience and he believes that early use of "Omnadin" will protect contacts from plague.

J. H. T. W.

Caius (J. F.) & Naidu (B. P. B.). **Chemotherapy of Bubonic Plague.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 3. pp. 481–487. [1 ref.] [Haffkine Inst., Parel, Bombay.]

This paper is a summary of results the authors have obtained in a first attempt at determining the bactericidal action of antiseptics on *Past. pestis*, and the effect of some of them on plague-infected animals. Phenols, mercurated phenols, phthaleins and dye-stuffs were used and many of these last have strong bactericidal action *in vitro*. To find the therapeutic value of these drugs is more difficult. Mercurochrome, active *in vitro*, has no influence on plague in rats or rabbits [this *Bulletin*, Vol. 24, p. 455 (Naidu)]. The same is the case with resorcinol and mercurated trypan-blue.

J. H. T. W.

Gaud (M.). Sur la vaccination antipesteuse au cours de l'épidémie du Sous (Maroc) en avril-juin 1929. [**Anti-Plague Vaccination in Sous, Morocco.**]—*Bull. Office Internat. d'Hyg. Publique.* 1930. Feb. Vol. 22. No. 2. pp. 271–273.

The population of the district immediately affected is about 8,670. All these people were inoculated with two injections of anti-plague serum from the Pasteur Institute. 357 cases of plague occurred among them—327 before "vaccination" was completed and 30 afterwards. In addition the population of the entire region was inoculated, making

19,120 " vaccinations." Among the 327 cases not inoculated, 185 died ; among the 30 attacked after general " vaccination " was complete, 24 died.

J. H. T. W.

Boyé. Sur la vaccination antipesteuse en Afrique Occidentale Française en 1928. [**Anti-Plague Vaccination in French W. Africa 1928.**]—*Bull. Office Internat. d' Hyg. Publique.* 1929. Oct. Vol. 21. No. 10. pp. 1691–1695. [1 ref.]

While in Dakar anti-plague vaccination was combined with a war against rodents, prevention in the surrounding districts depended upon anti-plague vaccine alone. The number of rats captured in 1928 reached 86,383 in the first eight months owing to the zeal of the natives being stimulated by a reward of 40 centimes for each rat brought alive to the Sanitary Officer. It was not possible to make vaccination compulsory, but, with help from the more influential inhabitants, 6,500 inoculations were made. In Senegal there were 116,822 with anti-plague lipo-vaccine during the year. 165 vaccinated persons out of this number were attacked with plague and the total number of plague cases was 1,950.

J. H. T. W.

Ragazzi (Carlo Alberto). Profilassi immunitaria della peste in Cirenaica. [**Immunization against Plague in Cyrenaica.**]—*Arch. Ital. Sci. Med. Colon.* 1929. Aug. 1. Vol. 10. No. 8. pp. 390–411. [11 refs.] English summary p. 412. [Inst. of Trop. Path., Univ., Bologna.]

The writer reports a large experience in anti-plague vaccination performed in Cyrenaica during 1914–18. An improved vaccine was made in a local laboratory. Upon the results of his observations the author draws his conclusions as to the value of anti-plague vaccination, supported by the opinion of others.

J. H. T. W.

Compton (Arthur). **Immunization in Experimental Plague by Subcutaneous Inoculation with Bacteriophage. Comparison of Plain and Formaldehyde-treated Phage-lysed Plague Vaccine.**—*Jl. Infect. Dis.* 1930. Feb. Vol. 46. No. 2. pp. 152–160. With 2 text figs. [9 refs.] [Public Health Labs., Alexandria, Egypt.]

Phage-lysed plague bacilli, used as vaccine subcutaneously in 3 doses at weekly intervals, are capable of producing a substantial immunity to a test mortal dose. The treatment of the phage vaccine by formalin kills the phage but does not destroy its immunizing power ; indeed, the immunization effected was even better than with vaccine containing active phage. Locally, the test dose produced ulceration and necrosis. No evidence was obtained to show that the immunity was due to the phage itself instead of to the lysed bacterial products of the bacilli.

W. F. Harvey.

Nicolle (Charles), Durand (Paul) & Conseil (Ernest). Vaccination préventive contre la pneumonie pesteuse par voie respiratoire. [**Vaccination against Pneumonic Plague by the Respiratory Tract.**]—*C.R. Acad. Sci.* 1930. Jan. 27. Vol. 190. No. 4. pp. 235–237.

In Tunis a severe epidemic of pulmonary plague broke out among

members of a particular tribe which had little or no contact with the rest of the population of the town. The whole of this tribe, 900 individuals in all, was successfully removed in one night to two different buildings outside the town. Not a single new case of plague pneumonia occurred thereafter in the town itself. A new method of preventive vaccination was adopted side by side with the usual method of subcutaneous inoculation. By this method a powder is inhaled in the dose of 3,000 million organisms at a sitting. The treatment was administered daily and in 214 cases was continued for 16 days. Among 503 individuals, inoculated subcutaneously, there were 5 cases of plague pneumonia, all fatal, while among 363 vaccinated by inhalation there there were 3 cases with one recovery. The authors do not come to any definite conclusion on the efficacy of respiratory vaccination, but believe it is a method to be tried for such an affection as plague pneumonia, which is otherwise a hopeless condition.

W. F. Harvey.

Flu (P. C.). Immuniseering van ratten tegen pest door middel van geconcentreerde bacteriophaaglysaten uit virulente pestbacteriën. —*Nederl. Tijdschr. v. Geneesk.* 1929. Aug. 31. 73rd Year. 2nd Half. No. 35. pp. 4010–4020. [10 refs.]

——. **Immunization of Rats against Plague by Means of Bacteriophage-lysates of Concentrated Suspensions from Virulent Plague Bacteria.** —*Jl. Trop. Med. & Hyg.* 1929. Dec. 16. Vol. 32. No. 24. pp. 353–356. [9 refs.]

——. Immunisierung von Ratten gegen Pest mit Hilfe von Extrakten aus virulenten Pestbakterien. (Der Bakteriophag als Lösungsmittel.)—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 223–232 (307–316). [5 refs.]

The bacteriophage in these experiments is used for the purpose of bringing into solution a large quantity of plague bacillary substance which is then used as the immunizing material. The main principles of the manufacture of this lysate have already been described (see this *Bulletin*, Vol. 26, p. 638). The plague bacillus and the plague bacteriophage must both be highly virulent. It is essential, if a vaccine is to be popular, that it shall not cause a very severe reaction. The author himself tried an injection subcutaneously of 1 cc. of the vaccine used for immunization of rats. Pain developed at the site of injection in about 3 hours' time and increased somewhat. It had almost disappeared by evening, although tenderness to pressure remained for 3 days. Swelling was present only for a few hours after injection and there were no general symptoms. The experiments made on rats had reference to the success obtainable by means of one, two and three successive prophylactic doses. The first attempt at immunization with a single dose of 3 cc. was not successful, probably because the prophylactic dose itself was too large. Better results were obtained with smaller doses. The series of inoculations and doses used in white rats were, three times with 0·25, 0·5 and 0·75 cc.; three times with 0·5, 1 and 1½ cc.; twice with 1½ and 1½ cc., and once with 1½ cc.; the mortality results were 2 out of 10, 2 out of 8, 1 out of 10, and 3 out of 17, respectively. Conclusions are that a concentrated suspension of virulent plague bacilli can be dissolved by bacteriophage to give a large amount of bacterial substance in a small amount of liquid, ready for use as a

vaccine, and a sufficient protection even with one dose in rats, without local or general symptoms. It seems worth while investigating how far the extracts of plague bacilli prepared with bacteriophage would be useful in the prophylactic inoculation of human beings.

W. F. Harvey.

Flu (P. C.). De bacteriophaag-antipest en de prophylaxis en therapie der experimenteele pest. [**Antiplague Bacteriophage in Prophylaxis and Treatment.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1929. Oct. 1. Vol. 69. No. 10. pp. 958–966. [3 refs.]

In discordance with the results attained by d'Herelle and Doorenbos at Alexandria with the bacteriophage treatment in cases of human plague, Flu could only register negative results in his experiments, which are presented in tabular form. In the blood of fowl (naturally immune to plague) the bacteriophage had no influence on the time during which the plague bacilli circulated in the blood after inoculation. Administration of bacteriophage to guineapigs subcutaneously either once or in repeated doses, or to white rats orally either 3–4 weeks before or immediately after the plague inoculation, yielded completely negative results.

W. J. Bais.

Doorenbos (W.). Opmerkingen naar aanleiding van de proeven van Flu betreffende immunisatie tegen pest, in verband met eigen ervaringen met pest en pestbacteriophaag. [**The Experiments of Flu on Plague Immunization and Personal Experiments with Plague and Plague Bacteriophage.**]—*Nederl. Tijdschr. v. Geneesk.* 1929. Nov. 23. 73rd Year. 2nd Half. No. 47. pp. 5472–5482. With 2 charts in text. [5 refs.]

After the rejection by Otten of plague prophylactic vaccination in Java as affording little protection against the disease, endeavours have been made to discover a better vaccine. It appeared from the experiments of Flu upon animals that this might be found in the bacteriophage lysate of plague bacilli. These experiments, however, did not always prove successful and some inoculated animals died of acute plague, even although the incubation period was lengthened by comparison with uninoculated animals. Experiments by the author afford grounds for the conclusion that this adverse result in inoculated animals is a plague intoxication, due to activation of intestinal organisms. Inoculation of plague in animals suffering from intestinal affections may result in rapid death with lesions of severity altogether disproportionate to the number of plague bacilli found in them. This is ascribed to symbiotic intoxication with pathogenic intestinal bacteria. The argument, generally, has much analogy with that used by Sanarelli in ascribing acute choleraic intoxication with algidity to a combined action of cholera vibrios with intestinal bacteria. An increased resistance to the plague bacillus may certainly be the result of vaccination with bacteriophage lysate, but this does not imply protection against a plague intoxication and should not be regarded as equivalent to a plague immunity. It is then not altogether surprising that, along with good results from the bacteriophage vaccine of Flu,

complete failures are also manifest. The conclusion seems obvious that, before this newer procedure is tested out on man, it is imperative to make further study of the pathogenesis of acute plague intoxication.

W. F. Harvey.

PIRIE (J. H. Harvey). **Plague Studies. I. Bacteriophage in the Prophylaxis and Treatment of Experimental Plague. II. Microbic Dissociation of *B. pestis* and its Importance in Connection with the Preparation of Plague Vaccine and Serum. III. A Veld Rodent Epizootic due to a *Pasteurella* other than *Pasteurella* (*Bacillus*) *pestis*.**—*Publications of South African Inst. Med. Res.* 1929. Dec. Vol. 4. No. 25. pp. 191–230. [27 refs.]

I. The success obtained with a prophylactic vaccine of *Past. pestis* lysed by bacteriophage was not of a very high order and only obtainable with repetition of dose. In the experiments with therapeutic bacteriophage it was found, in accordance with general experience, that the strain had to be of very high virulence and even then gave inconsistent results and partial success.

II. Dissociation of the *Past. pestis* was effected and forms obtained which, on first isolation, probably corresponded to the "S" and intermediate "O" forms. The culture, after 2½ years in the laboratory with monthly subculture, was reinvestigated and dissociation ultimately effected into presumed "S" and "R" types, which remained true. Differences between the types are given in tabular form. An "R" type is not likely to be of any value in the preparation of plague vaccines and sera. The contentious subject of the identity of the *Past. pseudotuberculosis* of rodents with *Past. pestis* is discussed and the author considers that he may have been able to convert an "R" form of *Past. pestis*, with characters very similar to *Past. pseudotuberculosis*, into an "S" or virulent *Past. pestis*.

III. The epizootic took place among Namaqua gerbilles (*Desmodillus auricularis*) and gave rise to the suspicion that it was plague. An organism was isolated with the characters of a *Pasteurella*, but the exhaustive examination of this organism both in the field and the laboratory leads the author to regard it as a new species, for which he proposes the name *Past. desmodilli*.

W. F. Harvey.

BEZSONOVA (A. A.) & LENSKAYA (G. N.). **Broth-Clouding Variations of *B. pestis*. (Materials on Dissociation of *B. pestis*.)**—*Rev. Microbiol., Epidémiol. et Parasit.* 1929. Vol. 8. No. 3. pp. 270–279. With 7 text figs. [43 refs.] [In Russian. English summary pp. 354–356.]

Four out of 150 strains of *Past. pestis*, which had been kept at room temperature without subculture for five months, gave rise to a uniformly diffuse turbid growth in broth instead of the usual flocculent growth and clear medium. Two of these strains reverted to the usual type of growth with the next subculture. Further investigation of the two broth-clouding strains led the author to consider that this was a dissociation phenomenon, referable to a smooth colony type which, like the smooth colonies of *B. anthracis*, proved an exception to the general rule and was avirulent.

W. F. Harvey.

Iwanowsky (N.), Gubarew (E.) & Golow (D.). Der chemische Bestand des Blutes bei experimenteller Pest der Meerschweinchen. [**The Chemical Condition of the Blood in Experimental Plague of Guineapigs.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1929. Vol. 8. No. 3. pp. 291–295. [14 refs.] [In Russian. German summary p. 358.]

The average chemical composition of guineapigs' blood in mgm. per 100 cc. is : sugar 117·9 ; residual nitrogen 35·08 ; calcium 7·23 ; chloride 507·2. In 8 guineapigs inoculated with plague there was increase of both residual nitrogen and calcium and decrease of chloride : sugar concentration remained unchanged. The rise of the nitrogen may be taken as an indicator of the condition of the animal, but the chemical changes in the blood in plague are in no way specific.

W. F. Harvey.

Bezsonova (A. A.). **The Hungry Acid Agar as a Differentiating Medium for** *B. pestis* **and** *B. pseudotbc. rod.* **Pfeiffer.**—*Rev. Microbiol., Epidémiol. et Parasit.* 1929. Vol. 8. No. 3. pp. 264–269. With 2 text figs. [In Russian. English summary pp. 353–354.]

With " hungry " agar, which is agar made without broth, a medium can be obtained which will serve to differentiate *Past. pestis* and *Past. pseudotuberculosis rodentium*. A suspension of 1 loopful of agar culture in 5 cc. normal salt solution is used for sowing. One loopful of this suspension is sown on 3 per cent. agar made with normal salt solution and with reaction pH 5·9–6·1. Of the 150 strains of *Past. pestis* tested not one gave any growth, while all the 11 strains of *Past. pseudotuberculosis rodentium* grew on this medium.

W. F. Harvey.

Korobkova (E.). Changement de pH et phénomènes de réduction observés au cours du développement de *B. pestis* et de *B. pseudotuberculosis rodentium*. [**Alteration of pH and Phenomena of Reduction by** *Past. pestis* **and** *Past. pseudotuberculosis rodentium.*]—*Rev. Microbiol., Epidémiol. et Parasit.* 1929. Vol. 8. No. 4. pp. 435–457. [15 refs.] [In Russian. French summary pp. 484–486.]

Bezsonova (A.). **Peptonised Rhamnose-containing Water as a Differentiating Medium for** *B. pestis* **and** *B. pseudotuberculosis rod.* **Pfeiffer.**—*Ibid.* pp. 458–461. [12 refs.] [In Russian. English summary pp. 486–487.]

In the first of these papers the alterations in pH occurring in Martin broth which has been fermented by yeast and has been adjusted to a reaction of pH 5·8–6·0 are described. The broth is sown with 0·2 cc. of a 48-hr. bouillon culture of *Past. pestis* and *Past. pseudotuberculosis rodentium* and the reaction measured daily for 10 days and continued at longer intervals up to 35 days. The alkalinization of the medium begins much more rapidly with the latter, but by degrees the difference of reaction between the two is equalized. The difference in reducing action of the two organisms is another means by which they may be separated. Methylene blue and Janus green are the best indictaors to use in a Martin broth of pH 6·8–7·0. The dyes are decolourized much more rapidly and intensively by *Past. pseudotuberculosis rodentium* than by *Past. pestis*.

In the second paper, the author uses a medium with the composition : rhamnose 1 per cent., peptone 0·5 per cent., and salt 0·5 per cent. of pH 7·2, containing litmus as indicator. Whereas 10 strains of *Past. pseudotuberculosis rodentium* produced acid in 24 hours at 28–30° C., 160 strains of *Past. pestis* produced no change even after 3 weeks.

W. F. Harvey.

MITCHELL (J. A.). Une épizootie chez les rongeurs sauvages dans le district de De Aar et les districts environnants de la province septentrionale du Cap. [**Epizootic among Wild Rodents in and near De Aar, S. Africa.**]—*Bull. Office Internat. d'Hyg. Publique.* 1929. Oct. Vol. 21. No. 10. pp. 1696–1709. With 1 map.

On November 5th, 1928, the magistrate of De Aar sent a message to the Chief Health Officer, Pretoria, stating that rats were dying in the gardens of the town. Dead rats were sent to the Research Institute in Johannesburg. The Press reported "thousands of rodents sick and dying" in De Aar and "a great migration of rodents from West to East." Dr. LAING was sent to De Aar to investigate, together with an Inspector of rodents (CHIVERS). Inspection and enquiry showed that, although the statements in the Press were somewhat exaggerated, there did exist a virulent and widespread epizootic, especially among rodents moving from the West. The town and railway were practically free from domestic rats (*R. rattus rattus*), but domestic mice were found. The gerbilles (*Desmodillus auricularis*) were severely affected and had entered the town during the early nights of the epizootic, and as many as 10 to 20 dead ones were often found in a single garden. Sometimes the long-eared mouse (*Malacothrix typicus*) was found. The municipal staff killed 103 rodents the first night of the operations and about the same number the second night. Dead bodies of rodents sent to the Research Institute, Johannesburg, arrived much decomposed, but microscopical examination strongly suggested plague. Animal inoculations gave only negative results. The map shows the wide extent of the epizootic. Plague certainly existed in Petrusville, 70 miles N.E. of De Aar, both bubonic and pneumonic (one case). As the epizootic was traced to other places around De Aar, karoo rats and other rodents were found infected. Their dead bodies were both macroscopically and microscopically like those from De Aar, but no plague bacilli were found. The Inspector found that he could transmit the disease to healthy gerbilles by scarifying with material from infected cadavers. The annexes suggest that the disease was not plague or, if due to a *Pasteurella*, it was one differing from *P. pestis*.

J. H. T. W.

NAIDU (B. P. B.), JUNG (Shamsher) & KAMAKAKA (K. H.). **Preparation of a Potent Anti-Plague Serum in India.**—*Indian Jl. Med. Res.* 1930. Apr. Vol. 17. No. 4. pp. 1259–1305. [30 refs.] [Haffkine Inst., Parel, Bombay.]

It is interesting to find from the historical introduction of this paper that HAFFKINE as long ago as 1897 used the "alternate case" method of assessing the therapeutic results of anti-plague serum. He found that there was "no evidence of any favourable effect attributable to the serum." The contention of the authors, however, is that it requires a plague serum of high potency to afford satisfactory results. This is borne out by their animal experimentation in which comparison, along with untreated controls, was made between their own serum and those obtained from other sources. The mortality in some of the animals used, sheep and calves, is apt to be high. It is astonishing, however, what large intravenous doses of virulent cultures were tolerated in these animals. In both the maximum dose reached was 50 agar slope cultures. Only 3 out of 21 sheep survived immunization

and 1 out of the 2 calves. Rabbits, sheep and calves are all animals in which haemorrhagic septicaemia, caused by a pasteurella organism very similar to the plague bacillus, is a common and fatal infection, whereas in the horse it is not. This fact is taken to be in favour of obtaining a really potent serum from the former animals and of excluding the latter. The agglutinating titre of a serum is considered to be a very good index to its potency as a therapeutic agent. It was found that the anti-plague sera of the Lister Institute, London, and of the Pasteur Institute, Paris, prepared from horses did not cause agglutination with local strains of plague even in a dilution of 1 in 2. Therapeutically the sheep serum prepared by the authors tried out on 100 rats gave a mortality of only 13 per cent. within one week of infection as compared with mortality of 52 per cent. among the 100 rats treated with Pasteur Institute serum and a mortality of 83·3 per cent. among the untreated controls. Results of the same order were obtained by the use of calf serum.

W. F. Harvey.

Tsurumi (Mitsuzo). Sur la destruction des rats et des puces pour la prévention de la peste au Japon. [**Destruction of Fleas and Rats for Prevention of Plague in Japan.**]—*Bull. Office Internat. d' Hyg. Publique.* 1929. Oct. Vol. 21. No. 10. pp. 1710–1714. [1 ref.]

This is a statistical paper dealing with fumigation of ships to destruction of rats generally. Tables are given showing the numbers of cases of plague and the number of infected rats in various places.

J. H. T. W.

Tsurumi (Mitsuzo). Epidémie de peste bubonique et septicémique dans la Mongolie intérieure, en 1928. [**Plague in Mongolia.**]—*Bull. Office Internat. d' Hyg. Publique.* 1930. Feb. Vol. 22. No. 2. pp. 261–265.

This is an official report of plague in the Chienchiatien region in 1928, 1,333 cases in all. It contains a list of the rodents found, but nothing else of importance.

J. H. T. W.

RABIES: A REVIEW OF RECENT ARTICLES. XIII.*

It will be remembered that it was resolved at the International Conference, held under the auspices of the League of Nations in 1927, that experiments on the relative efficacies of carbolized and etherized vaccines should be investigated at one of the larger Pasteur Institutes. The matter had been taken up some 16 months previously at the institute at Kasauli [India], and a report embodying the first part of these investigations is now presented by CUNNINGHAM and MALONE.[1] It had been claimed that, by the use of etherized vaccines (originally containing attenuated living virus, and later, virus killed by carbolic), the mortality from rabies could be practically abolished even in the case of the severely bitten, and that, in spite of the greatly increased dosage of brain substance employed, post-vaccinal paralyses were of rare occurrence. This naturally inspired workers in India with the hope that it might be possible to effect a reduction in the high mortalities which are found in statistics relating to the treatment of Indians, who form a very severely bitten group, and are consequently at an unduly high degree of risk. The authors review in the first place the Indian experience with dried cords, dilutions, and latterly carbolized vaccines. They then recapitulate their observations upon the resistance of various strains of virus to ether. They emphasize the fact that the Kasauli strain of fixed virus is very much less resistant than the Paris strain. In their tests on the human being the Kasauli strain was employed; both Kasauli and Paris strains were used in their experiments on animals. After immersion in ether for 72 and 84 hours it is shown that a brain infected with the Paris strain contains about 15 times as much living virus as a brain infected with the Kasauli strain.

The observations on human beings relate to 5,007 persons treated with etherized vaccines, and 14,255 treated with carbolized vaccines, that is to a total of 19,262 persons. The population was classified according to a modification of the system used by HEMPT. The dosage in the case of each method—Alivisatos, Hempt, and Semple as the case might be—was very similar to that ordinarily employed. Cases were followed up to six months, the proportion of complete returns received being of the order of 80 per cent.

The results for cases belonging to Hempt's *fourth* class (deep extensive bites, and all bites on head and neck) were as follows:—

Method.	*Total dosage.*	*Number treated.*	*Deaths.*	*Mortality per cent.*
Alivisatos ...	6–8 gm.	819	40	4·88
Hempt ...	4 gm.	723	46	6·36
Carbolized ...	0·7 gm.	325	28	8·62
Carbolized ...	0·7–1·95 gm.	1,004	81	8·07

* For the twelfth of this series see Vol. 27, pp. 251–263.

1 CUNNINGHAM (J.) & MALONE (R. H.). An Investigation into the Value of an Etherized Vaccine in the Prophylactic Treatment of Rabies. Part VII. The Comparative Immunizing Value of Semple's Carbolized Vaccine and the Etherized Vaccines of Alivisatos and Hempt (Original Method).—*Indian Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1930. Mar. Memoir No. 15. pp. vii+215. With 3 charts & 2 figs. on 1 plate. [47 refs.] [Pasteur Inst. of India, Kasauli.]

The only significant difference amongst these figures is in the case of Alivisatos as compared with carbolized, and this difference is such as might be expected to occur once in 143 times on the assumption that the treatments were equally effective.

The results for cases belonging to Hempt's *third* class (superficial bites on fingers, superficial extensive bites on all parts except head and neck, and deep but not extensive bites on all parts except head and neck) are as follows :—

	Number treated.	*Deaths.*	*Mortality per cent.*
Alivisatos	Not tested	—	—
Hempt	2,003	17	0·85
Carbolized	6,200	78	1·26

The difference is not significant.

For cases belonging to Hempt's *second* class (superficial but not extensive bites on trunk and extremities, excluding bites on fingers) they found :—

	Number treated.	*Deaths.*	*Mortality per cent.*
Hempt	1,142	6	0·53
Carbolized	6,200	28	0·45

Again an insignificant difference.

The effect of the variations in methods of treatment upon the *total* mortality has been furnished to the reviewer by CUNNINGHAM. In 1905, when carbolized vaccines alone were used and in the smaller dosage, the mortality at Kasauli was 1·86 per cent. ; in 1926, when only the worst cases of Class IV were treated with etherized vaccines the percentage was 1·94 ; in 1927, when all of Class IV and many of Class III were treated with ether vaccines, it was 1·74, and in 1928, when the same procedure was continued, the mortality was 1·54 per cent.

The conclusion from this part of the research is that Alivisatos' method yielded significantly better results than carbolized vaccines, in the doses employed, and that similarly significant improvements were not observed when Hempt's vaccine was used. That such improvements as have been observed are associated with the quantity of brain substance administered appears from the table for bites of the fourth class. (Observations on the relative efficacies of the various vaccines when given in the same dosage have been undertaken, and, in fact, are now complete. A second report dealing with these will shortly appear.)

The second section of the report deals with experiments on rabbits and monkeys. In these, treatment was given *after* the infecting dose had been administered. Those on rabbits were inconclusive "on account of the high degree of susceptibility of the rabbit." Those on monkeys showed a significant difference in favour of Alivisatos' method, as compared with Semple's, but not in favour of Hempt's. The results which relate to groups of 33 monkeys each, treated respectively

by Alivisatos', Hempt's and Semple's vaccines, and also respectively with Kasauli and Paris strain of fixed virus, are given in the fullest detail with regard to survival and incubation. (The reader is referred to the report, which I understand will be issued to all Pasteur Institutes by the League of Nations.)

The report concludes with recommendations based upon the principles: that treatment should be rendered available to all bitten persons; that delay in commencement of treatment should be avoided; and that the degree of dosage should in each case be proportional to the degree of risk. To meet these requirements the authors propose a scheme of partial decentralization. Subordinate centres would be in charge of a specially trained doctor, who would subdivide cases according to the four classes. Milder cases (Classes I and II) would be treated at subordinate centres by carbolized vaccines; the more severely bitten being sent to the parent institute for more intensive treatment. The nature of the treatment in this latter case will obviously depend upon the results of the second part of the investigation, which have not yet been published. The collection and analysis of statistical records would be a duty of the parent institute. The authors lay stress upon the fact that each case was followed up for six months after completion of treatment, and that complete returns were received regarding upwards of 80 per cent. (87 in the year 1929) of the persons treated. (This numerical statement regarding the following up of cases should be universally followed.) They also point out that at Kasauli 16 per cent. of cases belonged to Class IV, and that, finally, for local reasons, this percentage reached 20.

They observed that as regards both human and animal tests mortalities from street virus are higher at Kasauli than at other institutes in India, and suggest that the street virus of Northern India may be more virulent than that of other parts.

Finally, they record an instance of a strain of street virus which was pathogenic to the rabbit, but not, or scarcely so, to the monkey. Four of five rabbits developed rabies after infection by corneal scarification, whereas only one out of 24 monkeys succumbed to the same treatment.

i. *Virus.*

In a general paper for Spanish readers, Remlinger[2] summarizes his views regarding the problems presented by antirabic treatment in tropical countries. He recapitulates his arguments as to the identity of the virus associated with "*oulou-fato*" with that of rabies; he discusses the difficulties of diagnosis of rabies from pathological material, and suggests how these may be minimized; he describes the method of treatment by glycerinated cords, and recommends its adoption under tropical conditions; he reiterates his view that polyvalency of the vaccine is superfluous; and then goes on to consider methods of prophylaxis.

In a group of three papers the identity of the *oulou-fato* of French West Africa with rabies is discussed. Delpy, Cauvin and Riou[3] consider that

[2] Remlinger (P.). Algunas consideraciones sobre la rabia y el tratamiento antirrábico en los países tropicales.—*Medicina Países Cálidos.* Madrid. 1930. Mar. Vol. 3. No. 2. pp. 132–137. [8 refs.]

[3] Delpy (L.), Cauvin & Riou. Contribution à l'étude de la rage en A.O.F. Transmission de la rage du chien (Oulou fato) à l'homme et au guépard.—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 635–638. [6 refs.]

the identity is proved: whereas LEGER[4] holds the view that two viruses are operative, one of which is the ordinary virus of rabies, and the other is not transmissible to man. LEGER bases this view on the fact that certain persons bitten by rabid animals do not succumb to the disease though they have not received treatment. REMLINGER[5] exposes the fallaciousness of this reasoning, and reiterates his previous arguments, It may be definitely stated that there is no evidence in favour of the vrey dangerous hypothesis of LEGER.

A report on the characteristics of Tonking strains of street virus is furnished by BABLET and JOYEUX.[6] It appears that cases of human rabies are frequent in Tonking, that their incubation periods are short, and that treatment fails to protect more often than would be expected. The author contrasts the frequencies of incubation periods in Tonking and in Europe. In Tonking, 77 per cent. of incubations in man (calculated from a total of 58 cases) are less than 31 days, whereas in Europe (BABES) the percentageis about 25. The mean incubation in Tonking is 26 days, whereas in Europe it is 40 days. The mean incubation period in the dog in Tonking is 25 days. The incubations in rabbits inoculated with brains from cases of human or canine rabies are shorter than the usual. Virulence is preserved in glycerine from 25 to 30 days: and the virus resists desiccation for 8 to 10 days. (See also this *Bulletin*, Vol. 24, p. 762.) Tonking strains are thus similar to those of Cochin China. Strains of exalted virulence are frequently met with.

MARIE and URBAIN[7] have further examined the filtrability of rabies virus, following a technique used by YAOI and KASAI (*Japanese Journal of Experimental Medicine*, 1929, vii, p. 579) in the case of vaccinia. Through a fresh bougie distilled water was passed and thereafter an an emulsion of white of egg (3 per cent.) adjusted by means of hydrochloric acid to a pH of 4·8 to 4·6. In every case the filtrate obtained in this manner from fixed virus proved to be avirulent. The authors then turned to the ordinary method, but used as a diluent for the brain material Martin's bouillon at a pH of 7·2 (1 part of brain to 9 parts of bouillon). The emulsion was centrifuged for 10 minutes and the resulting supernatant fluid was filtered under low pressure, in presence of a culture of Pasteurella, through a Chamberland L_3 bougie. The filtrate so obtained infected 4 out of 8 rabbits intracerebrally and 6 out of 16 intraspinally. The authors invariably failed to achieve this result when distilled water was used as diluent.

MUGRAGE[8] examines the evidence regarding the presence of rabies virus in milk. Although no authentic case of infection of a human being from the milk of a rabid cow has been reported, a case of transmission through the breast milk of a nursing human mother has been cited (MOHLER, J. R.: Rabies or Hydrophobia, Bull. 449, U.S. Dept. of

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[4] LEGER (André). A propos de la rage en A.O.F.—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 907–908.

[5] REMLINGER (P.). A propos de la rage en A.O.F.—*Bull. Soc. Path. Exot.* 1930. Feb. 12. Vol. 23. No. 2. pp. 167–170. [3 refs.] [Pasteur Inst. of Morocco, Tangiers.]

[6] BABLET (J.) & JOYEUX (B.). Sur la virulence du virus des rues tonkinois.—*Ann. Inst. Pasteur.* 1930. Feb. Vol. 44. No. 2. pp. 141–147. With 1 text fig. [1 ref.] [Pasteur Inst., Hanoi.]

[7] MARIE (A. C.) & URBAIN (Ach.). Sur la filtrabilité du virus rabique (virus fixe).—*C.R. Soc. Biol.* 1930. Mar. 21. Vol. 103. No. 11. pp. 866–868. [2 refs.]

[8] MUGRAGE (E. R.). Milk-Borne Rabies.—*Jl. Lab. & Clin. Med.* 1930. Feb. Vol. 15. No. 5. pp. 460–464. [17 refs.] [Med. School, Univ. of Colorado, Denver.]

Agriculture 12, 1911). The author failed to infect rabbits by means of the milk of three rabid doe rabbits, by intramuscular injection. He concludes that the treatment of persons who have drunk the milk of a rabid cow is not necessary.

Busson[9] has studied the action of ether, dichlorethylene and trichlorethylene on fixed virus. He found, using strains of fixed virus from Cracow and from Paris, that 4 animals, treated with vaccines which had been extracted with ether for 96 and 120 hours, all died of typical rabies; whilst those animals which had been treated with vaccine extracted for 72 hours survived. A similar result was observed with Paris fixed virus which had been extracted with dichlorethylene. From a second series of experiments he found that a fixed virus, which was inoffensive when introduced in a single dose subcutaneously or intramuscularly, when given in repeated doses, as is done in antirabic treatment, may cause rabies, if the virus has been extracted with ether or di or trichlorethylene for 72 hours.

Cunningham, Nicholas and Lahiri[10] summarize their results on the action of ether on various strains of brain virus as follows: —

Strain.	*Passage.*	*Alive.*	*Dead.*
Indian street	—	48 hrs.	72 hrs.
Kasauli F.V. No. 1	859th	24 hrs.	36 hrs.
Kasauli F.V. No. 2	38th	72 hrs.	84 hrs.
Paris F.V.	1,301st	144 hrs.	168 hrs.

Experiments using cords and contrasting the deep and superficial portions of brain tissue indicated that this varying resistance of the virus is an innate property of the virus itself, and is not due to depth of penetration by the ether. The incubation periods in the rabbit of the 3 strains of fixed virus were all 7 days.

ii. *Symptoms. Course of infection.*

The statistics relating to 57 untreated and 90 treated cases which terminated fatally are examined by Busson.[11] In each case a rabbit was inoculated from the brain. Incubation periods in the rabbit from 11 to 21 days were observed in 90 per cent. of cases in the untreated and in 85 per cent. in the treated. Thus treatment of the parent case had no perceptible influence on the incubation in the rabbit. It appeared also that the incubation period in the rabbit was not related to the incubation period in the man with whose brain the rabbit was inoculated. The incubations in rabbits infected subcutaneously were approximately the same as in those infected subdurally; in particular, very short incubations after subcutaneous infection corresponded almost

9 Busson (B.). Der Einfluss des Aethers und anderer Entfettungsmittel auf das Virus fixe und seine Pathogenität. — *Ztschr. f. Immunitätsf. u. Experim. Therap.* 1930. Vol. 66. No. 5/6. pp. 465–472. [Federal Inst. for Protective Inoculation against Rabies, Vienna.]

10 Cunningham (J.), Nicholas (M. J.) & Lahiri (B. N.). The Action of Ether on the Rabies Virus. — *Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 3. pp. 531–536. With 2 figs. on 1 plate & 1 chart in text. [5 refs.]

11 Busson (B.). Experimentelle Studien über das Lyssavirus. — *Zent. f. Bakt.* I. Abt. Orig. 1930. Feb. 3. Vol. 115. No. 5/6. pp. 294–307. [Federal Inst. for Protective Inoculation against Rabies, Vienna.]

without exception to short incubations after subdural injection, and the same was true for long incubations. Busson concludes that the length of the incubation period is not so much a quantitative as a qualitative characteristic of the virus. [It may be remembered that, as regards the incubation period in the human case, McKendrick and Fox (*Indian Journal of Medical Research*, 1917, Vol. v, No. 2, p. 413), by examining correlations between incubation period and number of bites, depth of wound, intervention of clothing, effect of cauterization, and nature of biting animal, found no evidence of variation in the incubation period with the degree of the infecting dose.] On the other hand, the length of incubation was found to be increased with earliness in commencing treatment, showing that treatment after infection delayed the onset of symptoms. Busson's results would suggest that this delay operates only with respect to the case which is treated, and that the effect is lost on subpassage: in other words, he has found no evidence of any characteristic alteration of the virus as a result of treatment (in the human case).

Busson considers that his observations support his view that the virus exists in two forms, one of which is found in the nervous system and is characterized by its shorter incubation, and the other in the glands. In most natural infections the second is operative, but under particular conditions the nerve form may find its way to the glands, and so give rise to infections of shorter incubation.

In support of this view he cites four pairs of fatal cases bitten in each case by a single dog. Three of the pairs were bitten in the same situation: the first pair, bitten on head and cheek, had incubations of 35 and 43 days respectively: the second pair, bitten on lip and hand, showed incubations of 48 and 59 days: the third pair, bitten on hand and arm, incubated in 110 and 121 days; and the fourth, bitten on hand and arm, incubated in 72 and 35 days respectively. Rabbits inoculated, however, from the latter pair developed symptoms in 11 to 13 days and 14 to 16 days respectively. Thus, taking situation of bite into consideration, there is considerable agreement between the pairs of incubation periods. [A case cited by H. H. King in the Kasauli report for 1924 may be be quoted in this connexion. Seven of at least 81 persons bitten by a single jackal developed rabies in spite of treatment. The localities and incubations in these cases were, respectively, arm 39 days, hand 42 days, hand 43 days, arm 78 days, knee 62 days, foot 43 days, back 48 days.]

[A simpler interpretation of these phenomena would be that the virus of rabies varies from the "street" type at the one extreme to the "fixed" type at the other: that the latter is neurotropic and characterized by short incubations, whilst the former is associated with secretions and gives rise to longer incubations: that gradations between the two types may occur in nature; and, finally, that the virus tends to remain true to type and to resist abrupt modifications. The phenomena observed by Busson can in this way be explained without deviating from views which are generally accepted. The whole question is worthy of close statistical study, when sufficient data are available.]

► In the course of three years Glusmann, Prevtetschenskaja and Ssolowjewa[12] have had the opportunity of studying at the Pasteur

[12] Glusmann (M. P.), Prevtetschenskaja (L. A.) & Ssolowjewa (J. W.). Beobachtungen ueber kurze Inkubation des Strassenvirus. *Ztschr. f. Hyg. u. Infektionskr.*, 1930, Feb. 17, Vol. 111, No. 1, pp. 49–57. [2 refs.] [Bact. Inst., Kharkov.]

Institute of Kharkov 20 cases of street virus with short incubations. Of these 9 had incubation periods in the first rabbit passage of 5 days, 8 of 6 days, 2 of 7 days, and 1 of 12 days in the first passage, followed by 5 days in the second and third passage. In 8 of the 20 first passages Negri bodies were observed. They also studied 4 cases of human viruses with short incubations. Two of these were in untreated and 2 were cases of rabies treated by Högyes method. The incubation period in the case of the former 2 were 5 days in the first passage. Rabbits inoculated with the brain of the first treated human case showed incubations of 8, 6, 5, and 4 days ; and with the brain of the second, incubations of 6 to 7 days. The authors from these observations emphasize the impossibility of differentiating street from fixed virus by the incubation period alone.

An interesting observation is described by Schnauder.[13] A strain of virus obtained from a dog which died with symptoms of furious rabies was subpassaged through rabbits to the eighth generation, from two to four individuals occurring in each generation. Of the 2nd generation (1st passage) 2 out of 2 rabbits showed symptoms of fury, of the 3rd, 3 out of 4, of the 4th, 3 out 4, of the 5th, 2 out of 2, of the 6th, 7th and 8th, none out of 2 in each generation. He concludes that the appearnace of symptoms of fury depends upon the strain, but that the tendency dies out with repeated subpassage.

Livon and Placidi[14] report a case of rabies in a child of 2¼ years, bitten deeply on the face, whose treatment by glycerinated cords was commenced immediately and who developed symptoms on the 9th day after the bite, dying 48 hours later.

iii. *Pathology.*

Busson[15] presents evidence in favour of the accepted belief that in cases of street virus, infection with short incubation, Negri bodies are seldom found (see also this *Bulletin*, Vol. 27, p. 253). He also furnishes evidence in favour of the view that antirabic treatment prevents their appearance. From a survey of 37 cases of rabies in persons who had undergone treatment, he has found that in 42 per cent. the bodies were absent, an observation which he contrasts with the fact that in untreated cases a negative result is very rare. A further observation is that in treated cases with negative result, the proportion of children is unduly high. He believes that this antagonistic action of treatment on the Negri bodies supports the view that the bodies are parasitic in origin, and are not the results of a cell reaction. " If it were a cell reaction, then it is not clear why these reactions, in a case showing definite symptoms and terminating fatally, should fail to make their appearance." He believes in the existence of two types of virus, one occurring in the nervous system, and the other—a lower, more primitive form—which

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13 Schnauder, F. Rasende Impfwut der Kaninchen.—*Arch. f. Wiss. u. Prakt. Tierheilk.* 1929. Nov. 25. Vol. 60. No. 5. pp. 464–466. [1 ref.] [State Inst. for Vet. Research, Oppeln, Upper Silesia.]

14 Livon (J.) & Placidi (L.). A propos d'un cas mortel de rage.—*C.R. Soc. Biol.* 1929. Vol. 102. No. 36. pp. 1045–1046. [Pasteur Inst., Marseilles.]

15 Busson (B.). Ueber den Einfluss der Schutzimpfung auf die Ausbildung der Negrikörperchen im menschlichen Gehirn.—*Zent. f. Bakt.* I. Abt. Orig. 1930. Jan. 7. Vol. 115. No. 3/4. pp. 135–139. [Inst. for Protective Inoculation against Rabies, Vienna.]

is shed in the saliva and so causes natural infection. The tendency towards Negri body formation depends on the primitive form rather than on the neurotropic form, for with repeated passage from brain to brain the bodies become more and more scarce.

Kondo and Obana[16] failed to demonstrate the existence of specific antibodies in the serum of immunized rabbits, using antigens which had been cooked, glycerinated, extracted with alcohol or cholesterinized.

Following Remlinger and Bailly (this *Bulletin*, Vol. 24, p. 766), Schnürer and David (Vol. 24. p. 769) and de Georges (Vol. 24, p. 229) who found evidence of the development of a local cutaneous immunity in rabies, Torres[17] obtained similar results in the case of guineapigs treated by friction.

Tzeknovitzer and Goldenberg[18] submit evidence regarding the mechanism of immunization in rabies. They found from their experiments that friction of the skin with living vaccine which had been attenuated by desiccation neither caused infection nor gave rise to an immunity, and that friction with undesiccated living vaccine whilst causing infection in 2 out of 10 rabbits, also failed to produce immunity.

With vaccines introduced subdurally their results are summarized as follows. Certain vaccines dried over varying periods failed to infect. Those which were incapable of infecting also failed to confer immunity. A vaccine killed by formol and exhibited in massive doses subdurally, in certain cases (2 out of 5) conferred an apparent immunity. When vaccines were given intrameningeally following the technique of Marie and Mutermilch, they found: that a vaccine attenuated but not killed by ether caused rabies with prolonged incubation; that a vaccine killed by formol conferred immunity (5 out of 9 rabbits with a single vaccination, 7 out of 9 after two vaccinations, and 11 out of 12 after three vaccinations). In the case of the single rabbit which showed no immunity after three vaccinations, the cerebrospinal fluid had been withdrawn when the test dose was given.

From these and other experiments they conclude that the methods of vaccination to be preferred are those which increase the resistance of the haemato-cephalic barrier, which increase the penetration of rabicidal substances, and which provoke the production of defensive substances in the meningeal cavity; that immunity can be conferred by both living and dead vaccines; but that where the vaccine is introduced near the central nervous system the vaccine must be absolutely inoffensive.

From the summary in French of the Russian communication of Gantt and Panomarev,[19] it appears that this relates to the same set of

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[16] Kondo (S.) & Obana (K.). Studies of the Complement Fixation Reaction in Rabies.—*Jl. Japan. Soc. Vet. Sci.* 1929. Dec. Vol. 8. No. 4. pp. 252–257. [14 refs.] [Vet. Lab., Ministry of Agric. & Forestry, Nishigahara, Tokyo.]

[17] Torres (Sylvio). Immunidade local na Raiva.—*Rev. Zootechnia e Vet.* 1928. Vol. 14. No. 2. pp. 127–129. [5 refs.]

[18] Tzeknovitzer (M.) & Goldenberg (I.). Contribution à l'étude du mécanisme de l'immunité dans la rage.—*Ann. Inst. Pasteur.* 1930. Mar. Vol. 44. No. 3. pp. 330–339. [7 refs.] [Bact. Inst., Kharkov.]

[19] Gantt (V. C.) & Ponomarev (A. V.). Sur le mécanisme de la propagation du virus rabique (virus fixe) dans l'organisme.—*Arch. Sci. Biol.* 1929. Vol. 29. No. 3. pp. 239–252. [34 refs.] [In Russian. French summary pp. 253–254.]

observations as were reviewed in my previous summary (this *Bulletin*, Vol. 27, p. 255).

iv. *Methods of Treatment and Statistics.*

In a previous review (this *Bulletin*, Vol. 26, p. 221), the method of Vorreso and Frisoccio in which nucleo proteids extracted from rabies brains are used as vaccine was described, and satisfactory results were reported. In a second communication[20] these authors report similar successes. Of 5 rabbits treated with the vaccine 2 died, whereas of 5 controls all died. In a third experiment the nucleo proteid vaccine was prepared from a street virus brain. In this experiment, of 3 treated rabbits all survived, whilst of 3 controls none survived. Neutralization of virus with the serum of animals treated by this method was demonstrated. In order to investigate the specific nature of the nucleo-proteids in the vaccine two rabbits were treated with nucleo-proteids obtained from a normal brain; there was no evidence of protection.

From the annual report for 1928 by Malone[21] of the Pasteur Institute of India, it appears that of 6,089 persons treated at *Kasauli* 94 died, i.e., a mortality of 1·54 per cent. whilst of 2,485 treated at subordinate treatment centres, 6 developed rabies, i.e., a mortality of 0·24 per cent. The methods of treatment employed at *Kasauli* were Alivisatos' ether vaccine and carbolized vaccine in increased dosage (above), and at the subordinate centres Semple's vaccine in its usual dosage. A comparison of the efficiencies of the two methods of treatment used at Kasauli will be published later. The percentage of health returns received six months after completion of treatment was 87. No cases of paralytic accident were reported.

The number of patients treated at *Coonoor*[22] during the year 1928-29 was 405, of whom 5 died, i.e., a mortality of 1·29 per cent.; whilst at local centres 4,686 were treated, of whom 65 died, i.e. a mortality of 1·38 per cent.

The method of treatment employed at *Cluj* (Rumania) was described by Botez and Arnos in my former summary (this *Bulletin*, Vol. 27, p. 258). It consisted in administering dried cords along with emulsions heated according to the method of Pisarin. Statistics relating to persons treated in this manner are now presented by Botez[23]. Of 12,130 persons treated, 58 have succumbed to rabies, or a mortality of 0·48 per cent. The statistics include 69 wolf bites from which 8 (i.e., 11 per cent.) died.

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[20] Vorreso (G.) & Frisoccio (M.). Sur l'immunité contre la rage obtenue par le nucléo protéide. —*Bol. Sezione Ital., Soc. Internaz. di Microbiologia.* Milan. 1929. Dec. Vol. I. No. 12. pp. 277-280. [Hyg. Inst., Univ., Messina.]

[21] Kasauli. Pasteur Institute of India. The Twenty-Eighth Annual Report of the Central Committee of the Association and the Audited Accounts up to June 30th 1929. Also the Report of the Director of the Institute for the Year ending 31st December 1928 [Malone (R. H.)]. Part II.—63 pp. Simla.

[22] Coonoor, Southern India. Pasteur Institute. The Annual Report of the Director [Iyengar (K. R. K.)] together with the Twenty Second Annual Report of the Central Committee of the Association for the Year ending February 20th, 1929. 1929. Madras.

[23] Botez (M. A.). Quelques données sur les résultats de la méthode de vaccination antirabique employée à Cluj. —*C. R. Soc. Biol.* 1930. May 1. Vol. 103. No. 14. pp. 1351-1353. [1 ref.]

v. *Post Vaccinal Paralysis.*

The cause of post-vaccinal paralysis is fully discussed by SCHWEINBURG.[24] Since his original publication with KORITSCHONER (this *Bulletin*, Vol. 22, p. 699) the influence of normal brain substance has been investigated by many workers, and has been repeatedly referred to in these reviews. SCHWEINBURG's final conclusion is that it is improbable that these paralyses are all from a single cause. That normal nerve substance is one of the causative factors he has no doubt, and in this connexion he relates an experiment which he carried out with LÖFFLER. A number of animals were inoculated with a series of doses of an alcoholic extract of normal brain substance, diluted in certain cases with saline, and in others with pig serum. A single rabbit belonging to the latter group, developed symptoms of paralysis with ultimate recovery. The clinical history was fully analogous to the human cases which he and KORITSCHONER had previously described. As other workers have given similar doses of pig serum to "hundreds of thousands" of animals without harmful effect, he excludes the influence of the pig serum, and considers that in this case the causal factor was the nervous material. After surveying the results of STUART and KRIKORIAN (this *Bulletin*, Vol. 26, p. 223), and others, he considers that enough evidence has been brought forward to show that nervous substance itself may cause these accidents. He dwells on the fact that with killed vaccines paralyses may occur, though much more rarely than with living vaccines. Whilst he does not consider that the demonstration of the presence of fixed virus in the brains of fatal cases of post-vaccinal paralyses is a proof of any aetiological relationship, he considers it probable that in the majority of such cases, the fixed virus is the primary cause, and that the nerve substance injected along with the virus in some way favours its deleterious action.

The investigation is carried to a further stage by LÖFFLER and SCHWEINBURG[25], who have arrived at the conclusion that repeated inoculations of nerve substance weakens resistance against a subsequent infection with rabies. This result was arrived at from experiments on animals which prior to infection had been treated with repeated injections of alcoholic brain extract (to which in certain instances pig serum had been added). In the case of 7 treated and 4 control rabbits, 14 treated and 8 control rats, and 18 treated and 8 control guineapigs, which were treated by fixed virus, "in no case in which the control animal succumbed, did the treated animal survive". In each group the mortality amongst the treated was very much greater than amongst the controls. From a practical point of view it is advisable to give as little nervous substance as possible, or to use means to remove the lipoids of the vaccine.

In a previous paper (this *Bulletin*, Vol. 24, p. 230) BUSSON described a case of paralytic accident in a girl bitten by a dog which survived. The girl was treated on account of undue anxiety, and three weeks afterwards developed tonic spasms. In this case then, the causal factor

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[24] SCHWEINBURG (Fritz) "Ueber die Ursache der Lähmungen nach Wutschutzimpfungen." *Zeit. f. Hyg.* 1 Abt Orig. 1930 Feb 3 Vol 115 No 5/6 pp 307-314 (30 refs.) [Federal Inst. for Protective Inoculation against Rabies, Vienna.]

[25] LÖFFLER (Ernst) & SCHWEINBURG (Fritz) "Ueber Virus fixe-Infektion bei sensibilisierten Tieren." *Zeit. f. Hyg.* 1 Abt Orig. 1930 Feb 8 Vol. 115, No 5/6 pp 314-318 (6 refs.) [Federal Inst. for Protective Inoculation against Rabies, Vienna.]

was the vaccinal material. He now describes[26] a case of a boy of 13 years, whose skin was abraded by the teeth of an unknown dog. After three days' treatment by Högyes method (in all 12 mgm. of cord), the boy withdrew. Twenty-five days later after a fall, fever developed with pain and stiffness of the muscles of the neck and back. The spinal fluid was sterile. Death supervened. The post-mortem showed softening, oedema and haemorrhage in the cord and brain. Microscopic examination revealed a general picture of inflammatory necrosis with leucocytic infiltration. Neither Negri bodies nor Koch's granules were found. Two rabbits and two guineapigs inoculated intracerebrally, showed symptoms of rabies on the 7th day, as also did the same number after intramusuclar injection. On the other hand, a similar number injected subcutaneously remained healthy, a point of importance with regard to the differential diagnosis between street and fixed virus infection. In the brains of none of these animals were Negri bodies found. He maintains that the virus which was recovered was the same as the vaccinal material, but that it differed from it in increased " organo-specific-fixation ." He concludes that living virus is not under all conditions inoffensive, but may become pathogenic under conditions which are not yet fully understood.

Gutmann[27] reports two cases of atypical rabies. The first which had been treated by dried cords and carbolized vaccine simultaneously, exhibited symptoms of a meningitic nature. Negri bodies were not found. Subpassages in rabbits showed incubations of 16 and 22 days, and in dogs of 12 and 12 days. The second case presented the characters of an ascending paralysis. The treatment employed was that of Phillip. Negri bodies were not found. Passages in 20 rabbits showed incubations of 15 to 19 days. The relation of the second case to post-vaccinal paralysis is discussed. He also describes the case of a man who showed symptoms of an anaphylactic character after the first injection, and draws attention to a cystic body which he saw in the brain of one of the dogs inoculated with the brain referred to in the first case above.

A case, exhibiting the symptoms of the acute ascending paralysis of Landry, is described by Palthe[28]. The patient had undergone treatment at Bandoeng (Java). The termination was fatal. The author cites from the earlier literature cases of untreated persons whose symptoms were of a paralytic type. The clinical picture was that either of a true paralytic rabies, or of paralysis after treatment. " It might have been a case of abortive rabies in the sense of Joseph Koch."

Marque[29] describes a case of double facial paralysis following treatment by 14 injections of " fresh vaccine." The electrical reactions of the facial nerve, the frontal muscle, and the orbicular muscles of the eyelids and lips are detailed. The patient was an Argentine.

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[26] Busson (B.). Zur Frage der Ätiologie der postvaccinalen Lähmungen nach Lyssa-Schutzimpfungen. Ein Beitrag zur Pathogenese der Impflyssa.—*Klin. Woch.* 1930. Jan. 11. Vol. 9. No. 2. pp. 73–75. [Inst. for Protective Inoculation against Rabies, Vienna.]

[27] Gutmann (L.). Ueber seltene Formen der Wut und ueber Komplikationen im Laufe der Impfungen.—*Zent. f. Bakt.* I. Abt. Orig. 1930. Jan. 7. Vol. 115. No. 3/4. pp. 139–145. With 1 text fig. [18 refs.] [Sanit.-Bact. Inst., Swerdlowsk.]

[28] Palthe (P. M. van Wulfften). Rabies onder het beeld der acute opstijgende paralyse.—*Nederl. Tijdschr. v. Geneesk.* 1930. Apr. 26. 74th Year. Ist Half. No. 17. pp. 2108–2114. [15 refs.]

[29] Marque (A. M.). Accidente paralítico por vacuna antirrábica: diplejia facial. —*Semana Méd.* 1930. Mar. 27. Vol. 37. No. 13 (1889). pp. 806–808. With 3 text figs.

A case of paralysis following a course of treatment at Boston (U.S.A.) by a modification of Semple's carbolized vaccine is reported by BREED.[30] The symptoms were weakness and numbness of the legs, difficulty in micturition, headache, drowsiness, diplopia, ptosis, loss of lower reflexes, and fever. Lumbar puncture relieved the symptoms, and a slow recovery followed.

A second case is reported by SMITH and MURPHY[31] from Providence (U.S.A.), also after the employment of Semple's vaccine. In this the symptoms were those of numbness, difficulty in micturition, loss of reflexes. It was diagnosed as a case of Landry's ascending paralysis following antirabic treatment. Death supervened on the 14th day after the appearance of symptoms. The post-mortem appearances were those of lobar pneumonia, distension of bladder with degeneration of mucosa. The appearances in the brain and cord are described in detail. " The vessels throughout the brain were markedly congested, but the brain itself was grossly negative." as also was the cord.

vi. *Rabies in Animals*

Further observations on rabies in the cock and in the pigeon, are reported by REMLINGER and BAILLY[32], [33], [34], [35] (see this *Bulletin*, Vol. 26, p. 736). They show from experiments on 35 animals that in the cock the virus disappears from the site of inoculation in a very irregular manner. In the large majority of cases it is still present from the 7th to the 15th day. This latency is not so great as in the case of the tortoise which is a very refractory animal, nor nearly so short as in susceptible animals. The cock takes its place midway between the two types. It is feebly receptive, the latency of the virus is long as compared with the rabbit and the dog. When symptoms have developed the reactions of defence may still be active, and may lead to recovery. This is an example of the " neuro-infections auto-stérilisables " of LEVADITI.

Full clinical details of 9 cases of rabies in the cock are related. Of these, two were of the furious type, five were characterized by paralyses and two were abortive. In one of the latter symptoms of incoordination supervened, the animal was killed, and subpassages proved the existence of rabies. In the other in which the symptoms were roughness of voice, irregular gait, and difficulty in flying; the bird recovered.

Similar observations on experimental rabies in the *pigeon* are cited by the same authors. In the case of this bird the virus remains at the site of inoculation from 2 to 4 days. Six cases were paralytic in type, and 6 were abortive showing a tendency to recovery; none developed

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[30] BREED (William B.). Paralysis following Anti-Rabic Treatment with Case Report.—*New England Jl. of Med.* 1930. Jan. 23. Vol. 202. No. 4. pp. 151–153. [1 ref.]

[31] SMITH (Joseph) & MURPHY (John F.). Fatal Paralysis following Anti-Rabic Treatment. Report of a Case.—*New England Jl. of Med.* 1930. Jan. 23. Vol. 202. No. 4. pp. 153–154. [2 refs.]

[32] REMLINGER (P.) & BAILLY (J.). Sur le comportement du virus rabique dans l'encéphale du coq.—*C.R. Soc. Biol.* 1930. May 1. Vol. 103. No. 14. pp. 1165–1166. [2 refs.]

[33] REMLINGER (P.) & BAILLY (J.). Sur le comportement du virus rabique dans l'encéphale du pigeon.—*C.R. Soc. Biol.* 1930. May 1. Vol. 103. No. 14. pp. 1167–1168. [Pasteur Inst., Tangiers.]

[34] REMLINGER (P.) & BAILLY (J.). Nouvelles observations relatives à la rage du coq.—*Bull. Acad. Vét. de France.* 1929. Oct. Vol. 2. pp. 286–298. [5 refs.]

[35] REMLINGER (P.) & BAILLY (J.). La rage du pigeon.—*Ann. Inst. Pasteur.* 1929. Dec. Vol. 43. No. 12. pp. 1543–1559. [7 refs.]

furious symptoms. Negri bodies were invariably present. In exceptional cases the virus may be destroyed by the defensive mechanism—another example of the "*neuro-infections mortelles auto-sterilisables*" of LEVADITI.

MARIE[36] reports an interesting experiment on the differences between the sensitivity of the guineapig and of the rabbit. Mixtures of various strains of street virus, together with an equal quantity of fixed virus were prepared, and injected in suitable doses into the brains of 15 guineapig and of 15 rabbits. The fifteen guineapigs all showed symptoms in less than 7 days, and in every case yielded fixed virus as shown by further transmission. Of the 15 rabbits six developed street virus infection after from 13 to 18 days, and nine were infected with fixed virus (9th day) as was shown by subsequent subpassage. It would thus appear that the guineapig has a high susceptibility for rabies virus, in particular for fixed virus.

SCHOENING[37] relates a series of experiments on the immunizing properties of formalin, phenol and chloroform killed vaccines. The vaccines were in each case administered in a single dose. The test doses were variously intramuscular and intraocular. He failed to demonstrate an immunity with phenol and formalin vaccines tested intraocularly; his results were irregular with phenol vaccines tested intramuscularly. His best result was obtained from chloroform killed vaccine tested intramuscularly—of 8 vaccinated 5 survived, and 3 died otherwise, whereas of 6 controls, 5 developed rabies, and 1 was killed accidentally. The chloroform vaccine was prepared as follows: 1 part brain triturated with 2 parts of saline; filtered through gauze and chloroform added to 1 per cent.; room temperature 24 hours, then stored in ice-box. The vaccine was found to be alive on the 11th day, but not on the 17th day. It was used after six weeks in a dose of 5 cc. The author points out that a dose of his phenol killed vaccine corresponds to 0·5 grams of brain substance, whereas a dose of the chloroform vaccine contained 1·6 grams, and asks for further experimental study on the efficacy of the latter modification.

BARNES, METCALFE and LENTZ[38] submit a preliminary report on experiments relating to the prophylactic vaccination of dogs. In the first place they examined the relative infectivities after injection of street virus intraneurally, intramuscularly, intraperitoneally, intraocularly, intravenously and subarachnoidly on groups of 3 dogs each. They then contrasted the immunizing properties of single doses of four vaccines obtained from different laboratories, using subarachnoid test doses, and employing ten dogs in each case. Their results were alike inconclusive, the vaccinated dogs being not more immune than the controls. The nature of the vaccines is not stated. "Conclusions will not be drawn until a later report."

The control of rabies in Pennsylvania (U.S.A.) is discussed by MUNCE.[39] During 1927, 210 cases of canine rabies were reported,

[36] MARIE (A. C.). Sensibilité du cobaye au virus rabique.—*C.R. Soc. Biol.* 1930. Mar. 21. Vol. 103. No. 11. pp. 868–869. [1 ref.]

[37] SCHOENING (H. W.). Experimental Studies with Killed Canine Rabies Vaccines. —*Jl. Amer. Vet. Med. Assoc.* 1930. Jan. Vol. 76. New Ser. Vol. 29. No. 1. pp. 25–33. [8 refs.]

[38] BARNES (M. F.), METCALFE (A. N.) & LENTZ (W. J.). Investigations of Canine Diseases, with Special Reference to Rabies. Preliminary Report.—*Jl. Amer. Vet. Med. Assoc.* 1920. Jan. Vol. 76. New Ser. Vol. 29. No. 1. pp. 34–52.

[39] MUNCE (T. E.). The Control of Rabies in Pennsylvania.—*Jl. Amer. Vet. Med. Assoc.* 1930. Jan. Vol. 76. New Ser. Vol. 29. No. 1. pp. 53–55.

relating to 512 animals and 173 persons bitten. During 1928 the corresponding figures were 214, 2,281, and 172 respectively. In all, 640 positive cases have been reported amongst an estimated population of 700,000 dogs during a period of 2½ years. This low proportion is ascribed to the methods of control employed, viz. :—muzzling, and shooting of unmuzzled dogs during periods when quarantine has been proclaimed.

Remlinger and Bailly[40] [41] furnish a further report on the vaccination of animals against rabies in Morocco (see also this *Bulletin*, Vol. 22, p. 704, and Vol. 26, p. 737). The number of dogs which have been prophylactically treated in 1929 is 635. The ether vaccine has been used according to the procedure previously described. All have been observed for from 3 to 5 months. Of these, 52 were inoculated after the bite of rabid animals, and 519 were prophylactically treated. None have developed rabies. In only one case did symptoms of paralysis follow the inoculation, and in this it was difficult to determine whether the accident was due to the vaccine, or to intercurrent infection with distemper. The animal recovered in due course.

vii. *Miscellaneous.*

A simple method of removing the rabbit's brain is described by Ssavatejev.[42] The head is removed, and the brain substance sucked, under negative pressure, through the foramen magnum, into a sterile vessel. This is corked and weighed and the brain substance is broken up in it by means of glass balls. A glass vessel for storing vaccine is also described.

Itabashi[43] has applied the intraplantar method of inoculation, which has been employed in the case of the viruses of herpes and foot and mouth disease, to the virus of rabies. The method was successful.

Decentralization of antirabic treatment as applied to Chile is described by Orellana[44]. The vaccine is prepared according to the method of Fermi, modified in that the suspension is kept at 37° for 48 hours. Ampoules of vaccine are distributed to six subordinate centres.

In the *United States Naval Medical Bulletin* Kaufman[45] reports the treatment at San Diego of 22 men of the United States Navy, who had been in contact with a rabid dog, and Larsen[46] describes the measures which were taken in the case of three seamen bitten in China.

A. G. McKendrick.

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[40] Remlinger (P.) & Bailly (J.). La vaccination antirabique des animaux et du chien, en particulier, au Maroc en 1929.—*Bull. Acad. Méd.* 1930. Apr. 15. Year 94. 3rd Ser. Vol. 103. No. 15. pp. 397–403. [1 ref.] [Pasteur Inst., Tangiers.]

[41] Remlinger (P.) & Bailly (J.). La vaccination antirabique du chien au Maroc.—*Rev. Vét. et Jl. de Méd. Vét.* 1929. Sept. Vol. 81. pp. 483–491. [9 refs.]

[42] Ssavatejev (A.). Zur Methodik der antirabischen Impfungen.—*Zent. f. Bakt.* I. Abt. Orig. 1930. Feb. 20. Vol. 115. No. 7/8. pp. 464–467. With 1 text fig. [Metschnikov Inst., Moscow.]

[43] Itabashi (K.). Studies on the Intraplantar Inoculation of Rabic Virus. I. Experiments with *Virus fixe.*—*Jl. Japan Soc. Vet. Sci.* 1929. Dec. Vol. 8. No. 4. pp. 238–250. [17 refs.] [In Japanese. English summary pp. 250–251.] [Inst. for Infectious Diseases of Animals, Mukden, S. Manchuria.]

[44] Orellana. Descentralización del tratamiento antirrábico.—*Rev. del. Inst. Bact. de Chile.* Santiago. 1929. Vol. 1. No. 1. pp. 39–41.

[45] Kaufman (J. B.). Vaccine administered to 22 Men exposed to Rabies.—*U.S. Nav. Med. Bull.* 1930. Jan. Vol. 28. No. 1. pp. 248–252.

[46] Larsen (A. M.). The Use of Rabies Vaccine on Board Ships of the Yangtze Patrol.—*U.S. Nav. Med. Bull.* 1930. Jan. Vol. 28. No. 1. pp. 252–255

BERIBERI.

Far Eastern Association of Tropical Medicine, Transactions of the Seventh Congress, British India, 1927. Vol. 3. pp. 423–443. **Report of the Committee on Beri-Beri of the Philippine Islands.**

Beriberi is a prevailing disease in the Philippines. From mortality tables it appears that in 1910, 5,569 patients died from the disease, and in 1926, 19,204. The incidence rate is decreasing in Manila, but slightly increasing in the provinces. During the last three years, both the importation and the local production of rice have increased. There is a connexion between the incidence of the disease and the local production of rice. The labouring classes are most frequently attacked and the highest incidence figures are found between October and January. The average daily outlay of money for food for a family of two adults and three minors is P.1.35 ; too small an amount to permit of an abundant diet. Various recommendations are given regarding the inspection, care and analysis of rice based upon the findings of Vedder and Feliciano (this *Bulletin*, Vol. 25, p. 863).

A. D. Bigland.

i. Nguyen-van-Khai. Considérations sur l'épidémiologie du béribéri dans la province de Tân-an en 1927. [**Epidemiology of Beriberi in Tanan Province (Cochin China).**]—*Bull. Soc. Méd. Chirurg. Indochine.* 1929. Aug.–Sept. Vol. 7. Nos. 8/9. pp. 420–432. With 1 folding map.

ii. ——. Considérations sur l'épidémiologie du béribéri dans la province de Tanan en 1927.—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 982–994. With 1 map.

i. In 1925, in the Province of Tan-An, 20 cases of beriberi were reported (11 men, and 9 women). In 1926 there were 19 cases (10 men, 8 women, 1 child), and in 1927 the author observed 331 cases.

A study of this 1927 outbreak suggests that beriberi is a contagious disease. The maximum number of cases occurred in November, those attacked being men and women between 20 and 45 years. The aged and children under 10 seemed to escape and the disease by no means confined itself to the poorer classes. The Province of Tan-An is rich, and there are no famines. It is stated that the beriberi cases showed no evidence of starvation nor of avitaminosis.

On the clinical side the following points may be noted : gastro-intestinal symptoms were very prominent at the onset, and continued throughout the attack ; when the laryngeal nerve is involved there is hoarseness of the voice and difficulty in swallowing ; the prognosis is bad when the phrenic or vagus is attacked. The present outbreak seemed to be associated with the multiplication of small rice-decorticating factories, though a few cases of beriberi occurred each year before the introduction of decorticating apparatus.

A map of the Province is attached, showing the geographical distribution of the outbreak. Out of 62 villages, 35 produced cases of beriberi.

ii. Further observations show a definite amelioration of the outbreak during 1928 and 1929. In 1928 there were 232 cases, and in 1929 (January to June inclusive) only 22.

A. D. B.

JANTZEN (Walther). **Beriberi.**—*Seventeenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1928. pp. 138–143. [Truxillo Railroad Co. Hosp., Puerto Castilla, Honduras.]

In 1927 the author reported 5 cases of beriberi-like polyneuritis which occurred in Honduras during the years 1925–1927. Previous to this no cases had been noted in this country. Some doubt as to the true nature of this small outbreak was felt as the cases were relatively so few, there was no change in living conditions, and the food was rich in vitamin B. (beans, maize, rice, some meat, bananas and plantains).

During 1928 a change took place. Instead of 5 cases in 3 years, there were 18 cases with typical symptoms (doubtful cases were excluded).

Three cases are described in detail and these are taken as types of the disease. Eight patients presented slight symptoms only, viz.: absent deep reflexes in the legs, some sensory disturbances but no paralyses; six showed paralyses of varying degree, but they never lost the ability to walk. Four showed definite paralyses and were unable to walk. Oedema with nervous disturbances was found only twice, and a case is described in some detail which showed oedema only.

All the cases were Latin Americans who had lived many years in Honduras. The average age of the patients was 37 years, and they were mostly workmen. The disease was only noted in the wet season, August–February, the months of October, November, December, showing the greatest incidence. Ova of uncinaria were found in the stools in 13 cases. Malaria was present in some. The diet was apparently fairly rich in Vitamin B.

Treatment consisted in giving strychnine, arsenic and quinine (when necessary) and a special diet of brown bread, green vegetables, fruits, beans and meat. More recently the effect of yeast was tried. The average length of time under hospital treatment was 36 days. No deaths occurred.

The author feels justified in classifying these cases as beriberi, though it is admitted that the clinical findings and etiological factors are not quite in conformity with those met with in outbreaks elsewhere.

A. D. B.

MEGAW (J. W. D.). **Epidemic Dropsy: its Bearing on the Beri-Beri Problem.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 3. pp. 349–360.

A full account of epidemic dropsy is given. Under the heading of etiology the following points may be noted: The disease is almost certainly confined to rice eaters. Nearly all the sufferers have eaten parboiled rice which had been stored for several weeks or months in a hot, damp place after manufacture. In many outbreaks it was possible to trace the offending rice to one store, though the victims attacked were widely separated. In early cases, if rice is entirely omitted from the diet the disease is cured. As in beriberi epidemics, dropsy occurs usually during the wet season, and after the rains. Infants escape. There is apparently no change in the diet which can account for outbreaks. The disease is probably due to a toxic agent present on the rice before it is eaten.

Clinically, the following are among the usual findings: Oedema, generalized or only of the legs; cardio-vascular weakness; some fever; diarrhoea with vomiting at the onset; peripheral neuritis is a variable

finding; a tendency to haemorrhages in severe attacks; a great tendency to glaucoma during later stages; liability to sudden death from heart failure. This picture is contrasted with that of beriberi, and the resemblance and differences are examined. The author thinks that beriberi may include two or more distinct diseases, and that one of them is probably closely allied to epidemic dropsy. "Pellagra shows many points of analogy with beriberi, it may be worth while to make a comparative study of pellagra and beriberi with special reference to the part played by storage of corn and rice."

A. D. B.

McCarrison (R.). **Beri-Beri Columbarum.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 3. pp. 361–371.

The author's work on beriberi columbarum has already been reviewed in this *Bulletin* (Vol. 25, pp. 878–879).

During the course of the discussion which followed upon this paper and the preceding one by Lieut.-Col. Megaw, some interesting points were raised.

Lieut.-Col. Edward B. Vedder (Philippine Islands) objected to a toxin as the cause of epidemic dropsy on the ground that if such were present, it should surely be demonstrable, as is botulinus toxin. Since beriberi can be cured by giving extract of rice polishings without changing the diet he is strongly of opinion that this condition is not due to an intoxication.

Dr. B. Shaha (Bengal) claimed that epidemic dropsy is of infective origin. In support, he quoted the following cases:—

(1) In a multimillionaire's house in Calcutta, the family and the servants had a different food supply except for rice and mustard oil. The master and his family suffered from the disease whilst the servants did not.

(2) An epidemic dropsy convalescent patient moved from Calcutta to a Raja's house at Natore and within a month his whole family contracted the disease. The diet was good and there were no other cases in the neighbourhood. Some relations came to attend upon them and they started the disease in their family 10 miles away.

(3) In the Medical College Hostel among several messes having the same rice and oil, some escaped and some did not.

(4) British troops in Mesopotamia never touched rice, but yet they suffered from dropsy in an epidemic form.

(5) In East Bengal rice is taken at all four meals of the day. The rice is husked, parboiled and a year's supply is imported at a time; i.e., it is exactly similar rice to that eaten in Calcutta—yet no indigenous case of epidemic dropsy has been seen.

Dr. Chuni Lal Bose (Bengal) was opposed to the view that mustard oil had anything to do with the causation of epidemic dropsy. An outbreak of the disease occurred in a gaol in Upper Burma, and yet the Burmese do not use mustard oil. The Makwaris in Calcutta and Howrah do not take mustard oil, and yet they, too, suffer from the disease.

Lieut.-Col. T. H. Gloster, I.M.S. (Madras) described how he had isolated 45 different bacilli from the rices used by McCarrison. None was found in the beriberi rices only and none has had any effect upon guineapigs inoculated with them.

Lieut.-Col. C. A. Sprawson, I.M.S. (United Provinces) stated that British troops in Aden take no rice, but only wheat which had been stored for six months or more. A constant series of polyneuritis cases has been noted during the last 30 years. It is suggested that with the abolition of such prolonged storage of wheat the cases might cease.

Major H. Stott, I.M.S. (United Provinces), while not denying that some beriberi cases are due to deficiency, is of the opinion that a toxin found in stale rice is the cause in others. He cites an outbreak of beriberi among British troops in Lebong where there was no question of deficiency either in vitamin B. or any other dietary component.

Col. R. Kelsall, I.M.S. (Burma) stated that he had known beriberi in Burma for 20 years, and yet when an outbreak of epidemic dropsy occurred at Rangoon he found it clinically a new disease. He quoted a family of well-to-do Bengalese, in which the disease attacked everybody in the family, including the servants, within about 14 days. The dietary was exceptionally good, and there was no deficiency of any kind.

A. D. B.

Verghese (G.). **An Investigation of Samples of Rice believed to have been the Cause of Beri-Beri in Burma.**—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 929–944. [1 ref.] [Summary appears also in *Bulletin of Hygiene.*]

This work was an investigation of possible infection of the rice by micro-organisms, leading to beriberi in those consuming it. Twenty samples of rice associated with beriberi cases were investgiated, some of the samples being well polished, while others were only partially so. In all samples the grains had been damaged by milling. Micro-organisms isolated from the rice were not toxic when injected into rabbits or pigeons, but feeding pigeons with the rice produced emaciation and diarrhoea leading to death. Symptoms of head retraction appeared in some though not in all cases. It was possible to infect samples of good polished rice with the micro-organisms from the "beriberi" rice, these samples then producing the above symptoms in pigeons and leading to the death of the birds. In the excreta of pigeons fed on "beriberi" rice, the Gram positive type of bacteria abounded, whereas in healthy pigeons the Gram negative type was predominant. The author believes that the injury to rice grains produced during machine milling is the chief factor in allowing the grains to become infected by micro-organisms during long storage in a warm moist atmosphere. He suggests that these micro-organisms may lead to beriberi by producing toxic products in the rice or by removing a factor such as vitamin B from the grain.

D. C. Harrison.

Cannon (Alexander). **Some Observations on Beri-Beri.**—*Brit. Med. Jl.* 1929. Nov. 9. pp. 852–854. With 2 text figs. [2 refs.]

The author has formed very definite views regarding beriberi, based upon two years' research work on over 600 Chinese patients, and more than 80 post-mortems, together with animal experiments. Some of his conclusions are as follows :

"Beri-beri is a syndrome of the Orient, confined to orientals, chiefly males; seasonal in occurrence ; prevalent during the wet season ; partly infectious ;

a rice 'disease'; and is brought about by three factors. They are: (a) water-soluble vitamin B deficiency; (b) a bacterial infection, closely resembling or identical with the Bacillus asthenogenes of Bernard (1919); and (c) Endocrine organ disturbance."

It is stated that a low blood cholesterol content is essential for the occurrence of the beriberi syndrome, and that the "dry" and "dysenteric" forms of the disease are in reality a manifestation of malaria. In acute cases the blood pressure is low, about 80, while the spinal fluid pressure is raised to about 200. Increased sugar tolerance is present. Radiologically in beriberi the pulmonary vessels and the right side of the heart enlarge first, followed later by the left side of the heart. During convalescence, recovery takes place in the reverse order.

"Magnesium sulphate, given daily in doses amounting to 150 grams, administered as twenty-four half-hour doses during the twelve waking hours of the day and repeated, if necessary, on the two following days, together with ½ c.cm. of pituitary extract (B.W. & Co.) twice daily; also hypodermic injections of 1 c.cm. of a 5 per cent. solution of cholesterin in olive oil, given on alternate days for six to ten injections, bring about speedy amelioration of the symptom and sign complex; and, with the addition to the diet of vitamin B, complete the cure. Bernard's serums can also be used with good results."

Professor WANG found that the causal organism gives all the characteristics of "B. cohaerens" of Göttheil. In the presence of vitamin B. the organism is aerobic and saprophytic, but in the absence of vitamin B. it becomes anaerobic and pathogenic. It can be grown anaerobically upon equal parts of bouillon and milk and can be found in the peripheral blood during periods of gastric disturbances, and can always be isolated from the spleen. Complement fixation and agglutination tests can be performed successfully.

The pathology of beriberi is discussed more fully in another paper by the same author (see below).

A. D. B.

CANNON (Alexander). **The Pathology of Beriberi.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Nov. 25. Vol. 23. No. 3. pp. 263–268.

The following pathological findings are based upon post-mortems in nearly 100 beriberi cases at Hong Kong. The findings are remarkably constant.

Outwardly the body is bloated and rigidity occurs rapidly. The brain is markedly oedematous, the convolutions are flattened and the ventricles are full of fluid. Microscopically, the lymphatics are dilated and there is some vacuolation of the larger cells. The lungs are congested and oedematous. The stomach and intestines show congestion and often ballooning. The liver is congested, cirrhotic, and, microscopically, there is a small cell perivascular infiltration, many eosinophil cells being found. The kidneys are in an "acute parenchymatous stage," and, microscopically, cloudy swelling is present. The bladder mucous membrane is haemorrhagic and necrotic.

In the nerves (vagi, phrenic, intercostal and anterior tibial) three classes of change are described. (1) Cloudy swelling without interruption of continuity in both axis cylinder and medulla. This is found in an early stage and may recover completely. (2) Changes with interrup-

tion of continuity. The medullary sheath is fragmented and the axis cylinder may be full of granules. There is not much functional loss. (3) Atrophic changes in sheath and axis cylinder with interstitial tissue increase. Here function is greatly interfered with. The changes found in groups 2 and 3 indicate a chronic stage of the disease. The vagus and sympathetic nerves are much less affected than those of the periphery.

The arteries show some irregularity of the media with slight fatty change in the intima. Marked tortuosity of the pulmonary vessels is occasionally found. The blood presents relative polymorph leucocytosis with eosinophilia up to 15 per cent. and varying grades of anaemia. The muscles show fatty degeneration, the thyroid gland is enlarged, there is a "reappearance" of the thymus with enlarged lymph glands, the islets of Langerhans are hypertrophied, and the adrenals are hyperaemic and hypertrophied. Among other findings may be noted an occasional slight globulin increase in the spinal fluid, atrophy of the testicles and oedema at the auriculo-ventricular junction. In twenty cases keratomalacia was present.

A. D. B.

Shiroki (Takeshi). **True Nature of Beriberi and Vegetative Nervous System.**—*Japan Med. World.* 1929. May 15. Vol. 9. No. 5. pp. 141–155. With 1 text fig. [Med. College, Nagasaki.]

Beriberi, according to the author, is a syndrome caused either by lack of vitamin B or increased excitability of the sympathetic-nervous system ("Neurasthenia Sympathica") By repeated electrical stimulation of the sympathetic nerves in the legs of rabbits a condition resembling human beriberi was produced. By the same means applied to a lactating bitch, a condition like that of human infantile beriberi was brought about in the puppies suckled by her. Symptoms disappeared in the puppies when the electrical stimulation of the mother was stopped.

Experimental animals fed upon a diet rich in vitamin B were resistant to the production of "Neurasthenia Sympathica." The influence of climate, metereological conditions, age, sex, pregnancy, etc., upon the sympathetic nervous system is correlated with the incidence of beriberi.

The author concludes by stating that repeated electrical stimulation of the sympathetic nerves in rabbits leads to a hyperaemia of the adrenal cortex and hypertrophy of the medullary substance. The resulting production of adrenalin-like substances causes hyperaemia of the lungs and other organs and thus leads to dilation of the heart. Similarly oedema, neuritis, etc., are all signs of "Neuritis Sympathica."

[The English of this paper is so unusual that it has been difficult to interpret the exact meaning of the author.]

A. D. B.

Waring (J. I.). **Beriberi in Infants.**—*Amer. Jl. Dis. Children.* 1929. July. Vol. 38. No. 1. pp. 52–56. With 1 text fig. [4 refs.]

According to Vedder and also Hoobler, infantile beriberi is not met with in the U.S.A. Scott and Hermann, however, state that in Louisiana children are known to have acquired the disease. The author describes four cases in Charleston, S.C., which he thinks may be regarded as beriberi, but he admits that if the diagnosis of infantile beriberi can only be applied to nurslings whose mothers have the disease, then his cases will not fit into this category.

Case 1. A coloured infant; first seen when she was 5 weeks old. She had been fed upon a reasonable milk and sugar mixture, but failed to gain weight. First diarrhoea and oedema developed; later she showed a rapid pulse, cardiac hypertrophy and loss of knee jerks. Finally, hepatic enlargement and cardiac failure became manifest.

Case 2. A female coloured infant was aged two and a half months when she first came under medical care. After improper feeding, oedema and absent knee jerks were found. The rapid response to a varied diet, rich in vitamin B_1, seemed to justify the diagnosis of beriberi.

Case 3. Coloured boy aged one year. He was breast fed for eleven months. After weaning he had eaten nothing but hominy. Poor nutrition, oedema and absent or sluggish knee jerks resulted. After a varied diet and yeast tablets, he recovered, but on omitting the diet he relapsed. A second period of improvement followed the resumption of the diet.

Case 4. Coloured boy aged eight months. He was breast fed for seven months, after which he was given condensed milk and sugar. About three months later oedema developed. Upon a good diet combined with cod-liver oil, orange juice and yeast tablets, he rapidly improved and within twelve days he had gained 1 lb. 9 oz. The urine showed a trace of albumin throughout. The case was somewhat indefinite but probably belonged to the same class as the others.

The author is of the opinion that the last three cases were treated in time to prevent the full development of beriberi.

A. D. B.

GUILLERM (J.). Les troubles du métabolisme dans le béribéri. [**Disturbances of Metabolism in Beriberi.**]—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 970–981. [Pasteur Inst., Saigon.]

An elaborate series of clinical investigations is here recorded upon Annamite cases of beriberi in order to elucidate the metabolism of the condition. As controls the blood, urine, spinal fluid, etc., of normal natives were taken. The results in beriberi cases may be given briefly as follows :—

Blood—*Urea.* In acute cases this is markedly increased. In chronic cases the figure returns to normal, even though the disease progresses.

Uric Acid. In acute cases always definitely increased.

Glucose. Hypoglycaemia is the rule.

Cholesterin. Low in the normal Annamite, but lower still in beriberi. The figures, even in the same case, are very variable.

Chlorides. Chloride retention is the rule, more marked in "wet" beriberi.

Calcium, Phosphorus and Alkaline Reserve. All lessened.

Spinal Fluid—*Albumin.* About normal.

Glucose. Somewhat increased.

Chlorides. Increased.

The ratios between glucose in spinal fluid and in the blood (a constant in health) is raised above the normal figure. ·5, while the ratio of chlorides is about normal.

Urine.—Oliguria is the rule. Chlorides and phosphates are diminished. Traces of albumin may be present. Urea is lessened relatively and absolutely.

A discussion of the metabolism of the above substances follows, but the main findings appear to be a constant acidosis and a hypoglycaemia with chloride retention.

A. D. B.

KEEFER (Chester S.). **The Beriberi Heart.**—*Arch. Intern. Med.* 1930. Jan. Vol. 45. No. 1. pp. 1–22. With 4 charts. [24 refs.] [Peiping Union Med. College, Peiping, China.]

The first part of this work deals with beriberi cases which showed signs of cardiac insufficiency. Of the 15 patients in this group, 13 survived. The cardiac symptoms exhibited were dyspnoea and palpitation on exertion, and oedema of the legs (probably cardiac in origin). In 4, the liver was enlarged, in 4 hydrothorax was present, 3 showed pulmonary congestion and 1 had ascites. The average pulse rate was 106 with normal rhythm, but the slightest exertion caused a great increase in the rate. The cervical veins were engorged in 4 patients, and increased arterial pulsation with collapsing pulse were found in 5. In all cases the cardiac dulness was increased both to the right and to the left. Systolic murmurs were heard at the apex and pulmonary area in 10 cases and the pulmonary second sound was accentuated in 10. There was no constant change in the blood pressure. Electrocardiographic examination revealed no characteristic alteration. Radiographically the heart was enlarged. "The enlargement was due to an increase in the right auricle and the right ventricle, the pulmonary artery and the superior vena cava. A decrease in the size of the heart occurred rapidly following a proper therapy."

The cases without cardiac insufficiency showed chiefly nervous symptoms. The pulse rate was lower than in the former group, the E.C.G. observations were essentially the same, and radiologically in two cases the same type of cardiac enlargement as in the other cases was recorded. It is important to note that those who had pronounced nervous symptoms and signs did not show cardiac failure, because they were unable to get about, but in those who are able to walk, there is an added strain on the myocardium with resulting cardiac failure. Any xertion is therefore contra-indicated.

As regards the mechanism of heart failure in beriberi three hypotheses are discussed.—(1) *The Vagus Hypothesis.* There is no evidence to show that paralysis of this nerve leads to heart failure and many patients have heart failure with no signs of vagal involvement. (2) *Hypothesis of Respiratory Paralysis.* This fails to account for those cases of cardiac failure without hydrothorax or diaphragmatic paralysis. (3) *The Water Retention Hypothesis.* Is undoubtedly the one upon which the facts can best be explained. In this hypothesis retention of water is the cause of the cardiac enlargement and of the deficient contractility of the heart muscle. The prompt recovery which results from the giving of an adequate diet and yeast without digitalis is also in favour of this view.

A. D. B.

BELL (P. S.). **Home-Made Yeast as a Treatment for Beri-Beri.**—*Kenya & East African Med. Jl.* 1929. Nov. Vol. 6. No. 8. p. 237.

At the beginning of April, 1929, there were 5 cases of the neuritic type of beriberi in the Tanga Native Hospital. A generous supply of vitamins A, C and D was supplied, but relatively little vitamin B could be obtained owing to commercial yeast being unprocurable. The cases made little or no progress towards recovery. The local, home-made raising agent (made from dried hops) was found to contain typical yeast cells and it fermented sugar. The three worst beriberi cases

were given this preparation in one ounce doses twice daily, two cases being kept as controls. "About the middle of May two of the men were able to be repatriated and the third absconded." The two controls remained in their former condition, but upon being given the home-made yeast they, too, rapidly recovered.

A. D. B.

JANSEN (B. C. P.) & DONATH (W. F.). **Prophylaxis and Cure of Beri-Beri by Vitamin-Preparations.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 3. pp. 372–374.

In the authors' opinion the most urgent measure for the control of beriberi is research to discover a cheap synthetic anti-beriberi vitamin. This ideal has not yet been attained, but in the meantime three different preparations are made by the medical laboratory at Batavia. (1) One consists of fuller's earth, which has absorbed the vitamin from an extract of rice polishings. A daily dose of one gram will protect a person whose chief food is polished rice and half a gram, or two tablets, is sufficient when, in addition to polished rice, a moderate amount of other food is taken. (2) A solution similar to the above. 1 cc. of this extract contains the vitamin from ±300 grams of rice polishings. It is especially suitable for infantile beriberi cases. (3) For use in acute cases sterilized ampoules of fuller's earth extract in saline are made. One 2 cc. ampoule contains 1 mgm. of vitamin. These are so little toxic that a mouse can receive a subcutaneous or intravenous dose of 1 ampoule (the usual human dose) without ill effect.

The demand for these preparations is very great; in one month 100,000 tablets were issued to physicians. At present 10 tablets can be delivered for a penny, but it is hoped that in a short time the price can be halved. In order to make these tablets as useful for prophylaxis as for treatment they have been mixed with pure table salt; after 2 months there is no destruction of the vitamin, but further observation is necessary.

A. D. B.

BERNARD (Noël). Note sur la prophylaxie du béribéri. [**Prophylaxis of Beriberi.**]—*Ann. de Méd. et de Pharm. Colon.* 1929. July–Aug.–Sept. Vol. 27. No. 3. pp. 453–456.

It is recommended that in order to prevent beriberi in oriental countries the native dietary should be reduced with respect to its rice content and that wheat, fresh fish, fats, fresh vegetables and fruits should be judiciously added. When beriberi has actually appeared the first thing to do it to prevent any rice being eaten. In Indo-China a special rice is prepared for native workers which is decorticated in such a manner as to preserve the greater part of the husk, so that it is agreeable to the taste and can be transported long distances. It appears that good results follow this dietary, but the natives find that the rice prepared in this way is too rapidly digested, and does not give a feeling of repletion. Nevertheless, the author finds it unwise to accede to the frequent request that the amount of the ration should be increased.

A. D. B.

Newcomb (Clive). **The Water-Content of the Heart Muscle in Beri-Beri Columbarum.**—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 721–734. With 2 diagrams. [2 refs.] [Pasteur Inst., Coonoor, S. India.]

"The object of the investigation, with which the present paper deals, is to ascertain by chemical analysis whether in beriberi columbarum, induced by diets similar to those in use by human sufferers from the disease, the water-content of the heart muscle is increased, and if so, whether this increase can account for the large size of the heart."

Ninety-six pigeons, in four batches, were fed upon highly milled washed rice with the addition of either dal or ragi. Forty-eight birds, in two batches, were used as controls. Of the deficiently fed birds 84 died of polyneuritis, 8 of beriberi columbarum and 4 from other causes.

The effect of a beriberi diet on the pigeons' hearts is as follows :—

"(1) In the majority of the birds, a diminution in the size of the heart and an increase in the water-content of the heart muscle (polyneuritis columbarum and starvation).

"(2) In a minority of the birds, an increase in the size of the heart, and some increase in the water-content of the heart muscle (beriberi-columbarum). This increase is, however, certainly not greater than, and probably less than, in other pigeons, suffering from the effects of the diet.

"(3) The large heart of beriberi-columbarum is not to be explained by water-retention."

A. D. B.

Sasaki (R.). Sur l'électrocardiogramme dans les cas de béri-béri des nourrisons. [**The Electrocardiogram in Infantile Beriberi.**]—*Oriental Jl. Dis. Infants.* 1929. July. Vol. 6. No. 1. [In Japanese. French summary pp. 16–17.] [Pediat. Inst., Imperial Univ., Kyoto.]

Electro-cardiographic readings were taken from 79 infants suffering from beriberi. The results show a preponderance of the right side of the heart. This phenomenon, in the majority of cases, appears between the twentieth and thirtieth day of the disease and does not disappear for a month or two.

The author is of the opinion that these results show that in infantile beriberi there is not only cardiac dilatation but also hypertrophy.

[Considerably greater detail of the electro-cardiographic findings is given, but these have been omitted as they are of interest only to cardiologists.]

A. D. B.

Sasaki (R.). **The Electrocardiographic Study of Infant-Beriberi. II. The Electrocardiogram of Normal Nurslings and Children in Japan.**—*Oriental Jl. Dis. Infants.* 1930. Mar. Vol. 7. No. 2. pp. 27–29.

Continuing his work on the electro-cardiographic study of infantile beriberi cases, the author here turns his attention to the E.C.G. findings met with among healthy Japanese children. Electrocardiograms were taken of 146 normal children whose ages varied from 20 days to 15 years. The results can only be appreciated by cardiologists and, having little general interest, are here omitted.

A. D. B.

PELLAGRA.

CLUVER (E. H.). **Pellagra among the Maize-eating Natives of the Union of South Africa.**—*Brit. Med. Jl.* 1929. Oct. 26. pp. 751–754. [9 refs.]

Though maize, or mealies, is the chief article of diet among the Bantus of South Africa, pellagra outbreaks are rare; in fact, only three such have occurred. In 1906, 150 pellagrins were found among 3,000 Zulu rebel prisoners; in 1912–13, 60 native inmates of the Pretoria Mental Institution developed pellagra; and a recent outbreak in the Durban prison command in which, up to date, 64 cases have been reported. In addition about 50 sporadic cases have been diagnosed from Natal (including Zululand) and the Transkeian native territory of the Cape Province. The majority of these were Bantus, with some Eurafricans, Indians and only six Europeans. The relative rarity of pellagra in South Africa is probably due to the crude methods of maize grinding employed.

Other cases of pellagra are described, but the main part of this paper deals with the outbreak in the Durban prison command. During the period December 1927–1928, 64 cases occurred, all amongst non-Europeans. "Of the 63 pellagrins of whom detailed information is available, only 2 showed symptoms on admission to gaol; in 25 symptoms appeared within three months of admission; 10 had been in prison three to six months; 8 six to twelve months; 5 one to two years; 13 over two years."

As regards the cause of this outbreak a diet deficiency may certainly be blamed. The prison diet scales are uniform throughout the whole Union, maize is the principal food and P.P. factor is grossly deficient. It is curious that pellagra only occurred in Durban and not elsewhere. The probable explanation is that some contributory factor was present. It is suggested that this factor is to be found in hard work in intense sunlight.

The author recommends that such outbreaks should be prevented by adding to the diet a substance rich in P.P. factor, such as yeast.

A. D. Bigland.

STANNUS (Hugh S.). **Deficiency Diseases in Sierra Leone and Pellagra.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Apr. 17. Vol. 23. No. 6. pp. 627–632. [18 refs.]

In 1928 WRIGHT (*West African Med. Jl.* Vol. 2. No. 2) published an article entitled "Diseases due to A and B Avitaminosis in Sierra Leone." In this paper there is described a condition characterized by (1) glossitis, (2) soreness at the angles of the mouth, (3) glazing of skin about the inner canthus, (4) changes in the skin in the region of the vulva and scrotum. Associated with these signs are (a) tremulous tongue, (b) altered knee jerk, (c) paraesthesiae of the extremities, with burning of the feet, (d) dimness of vision. Deficiency in Vitamin A is responsible for the signs in the numbered series and lack of Vitamin B for those in the lettered series. The author recalls other observations on similar or allied conditions.

He contrasts these findings with those noted by himself in his work on pellagra among natives of East Central Africa. He is of the opinion that WRIGHT's cases are in reality " pellagra fruste."

NOGUE (1925) described an epidemic of glossitis among native children at Dakar. Gastro-intestinal symptoms were found in some cases and the diagnosis is suggestive of pellagra, especially as there was a seasonal incidence of the condition and improved feeding relieved it. Somewhat similar outbreaks have been described by JASMIN (1925) in Tunis, by MONTPELIER, CATANEI and COLONIEU (1927) among natives of Algiers and by KATZENELLENBOGEN (1928) in Palestine. Though the glossitis was possibly due to some infecting organism, an accessory food factor deficiency may play an important part in the etiology.

BRADLEY, in Seychelles, has reported a condition known as " decoques." Here, too, soreness of the angles of the mouth together with erythema of the genitalia and variable knee jerks were associated with diet deficiency.

The symptom " burning feet " has been noted elsewhere. DUGDALE (1928) found it associated with neuritis among ill-nourished coolies, and COOPE (1928) described epidemic waves of this condition among Tamil coolies. The possibility of pellagra is again suggested.

The author proceeds to discuss the " neuritis " met with in pellagra and shortly reviews the work on this subject. In addition to a true neuritis there are pathological appearances of more widespread nervous system involvement. In this connexion reference to the observations of H. H. SCOTT in Jamaica is made. This worker described an outbreak of central neuritis among sugar-cane labourers. The disease started with photophobia, inflammation of the eyelids and burning sensations of the mucous membranes of the lips and cheeks, associated with fissuring at the angles of the mouth. Later, these were followed by (a) diarrhoea ; or (b) constipation with neuritic symptoms, weakness and failing vision and hearing. SCOTT formed the opinion that this condition was caused by an acute intoxication rather than by a food deficiency.

Stannus believes that pellagra is " one of a number of syndromes produced by the action of a toxin in the absence of Vitamin B." Allied conditions can be explained by variations in the degree of vitamin deficiency, by the rapidity of vitamin withdrawal and by the nature of the toxic factor.

A. D. B.

BOASE (Arthur J.). **Report on the Incidence of Pellagra in Uganda.**—*Uganda Protectorate Ann. Med. & San. Rep. for Year ended 31st December, 1928.* Appendix No. V. pp. 89–94. With 4 figs. on 2 plates.

In 1924 several cases of a condition resembling scurvy, characterized by diarrhoea and oedema, were reported from Luzira and Kampala prisons. A similar outbreak with a high mortality occurred at Mbale prison in 1919. In February 1928 pellagra was first recognized in Uganda. During this year 34 cases were found in four prisons, all in native prisoners. The appearances were typical as evidenced by the clinical account and photographs. Autopsies were performed on four cases at Lira. The author's conclusions are :—

" (*a*) It has been conclusively shown that pellagra and xerophthalmia

occurred in certain prisons in the Protectorate, and that at these prisons the diet was in accordance with the authorized scale.

" (*b*) Neither disease was reported from other prisons where food supplies depended to a large extent on local produce.

" (*c*) An experimental diet, of which the chief features were the introduction of a meat ration and insistence on a daily issue of fresh vegetables, has been tried at Kampala and Luzira prisons with satisfactory results. Pellagra and xerophthalmia are now non-existent at these prisons.

" (*d*) The dietetic advantages of local produce, notably sweet potatoes, over imported maize flour are clearly established. The utilization of local foodstuffs should therefore be encouraged, and, if revision of the scale of diet is contemplated a greater latitude of choice should be allowed to local authorities. In this connection it appears desirable that each prison should be made selfsupporting and that the first claim on prison labour should be for purposes of food cultivation."

A. D. B.

ROBERTS (Stewart R.). **Pellagra of Today.**—*Internat. Clinics.* 1929. Mar. 39th Ser. Vol. 1. pp. 65–76. With 15 figs. on 12 plates. [14 refs.]

Clinically pellagra may be summed up as " dermatitis, diarrhoea and depression " ; economically and socially as " poverty, ignorance and neglect."

In a discussion of the history of the disease the author points out, that though pellagra is endemic in the U.S.A., three epidemics have occurred. The first lasted from 1906–1912 ; the second from 1914 to 1917, and the third from 1926 to the present. Probably there have been considerably more than half a million cases in the U.S.A. since 1902.

The disease is no respecter of age, cases occurring up to 60 years and over. The age period 20–40 shows the maximum vulnerability. Women are more frequently attacked than men. Practically any disease or condition which lessens food intake or hinders metabolism and absorption may cause pellagra. Thus alcoholism, carcinoma of the alimentary tract, mental strain, etc., play their part.

Acute attacks may occur at any season, though usually at the end of the winter or in the autumn. There are three grades of the disease : the first, termed acute, which is often fatal ; the second, or subchronic, with one or more mild attacks during two or three years ; and the chronic form which may last from five to thirty years, with mild attacks annually or less frequently.

A very full account of the pellagrous skin manifestations is given, and stress is laid upon the presence of two separate conditions, a dermatitis and a dermatagra, or rough scaly, branny skin. In the discussion of the alimentary and nervous systems there is nothing particular to note, except the author's computation that about 10 per cent. of pellagrins become insane.

The problem of diagnosis is considered under three headings :—

(1) *The pre-pellagrous condition.*—In this there are several chief types :—

" (*a*) The under-nourished child, youth or young adult, more often female . . . with a restricted diet."

"(*b*) The young married woman with children, much work," and with insufficient food owing to poverty, disease or some nervous state.

" (*c*) An older woman near the menopause or after," with diet deficiency. " Severe pelvic laceration and constipation are usually present in this type."

"(*d*) An emaciated man, usually a drinker or heavy smoker, whose food is apparently merely an incident in life."

(2) *The acute attack.*

(3) *The condition between attacks.*—Here the patient is usually below par, presents some nervous instability and gives a history of acute attacks.

Under the heading of etiology, the author states: "most of us seem to know the cause of pellagra until we really face it, and then it becomes vague and very distant, and we hazily conclude that the cause is over in the cupboard somewhere among the proteins and vitamins that are not there."

The therapeutics of pellagra is most carefully considered. The following are the chief conclusions:—Arsénic is an overrated drug; psychotherapy is useful to instil hope and to help the patient to eat; a well-balanced diet should be given with a calorie value of 10 per cent. above that of the patient's ideal weight, and it should contain vitamins, and not less than 2 gm. of protein per kilo of body weight, distributed among meats, milk, eggs and vegetables. Dilute HCl 20–40 minims with meals and tinct. nux vomica in 20 drop doses are recommended, together with one to two drachms of brewer's yeast 2 to 4 times daily.

A. D. B.

GUTHRIE (R. H.). **A Review of Cases of Pellagra admitted to the Boston Psychopathic Hospital from 1922 to 1928 with Special Reference to Alcohol as an Etiological Factor.**—*New England Jl. of Med.* 1929. Aug. 29. Vol. 201. No. 9. pp. 414–420. [10 refs.]

"Fourteen cases of pellagra admitted to the Boston Psychopathic Hospital during seven years ending with 1928 were reviewed. Six cases diagnosed alcoholic psychosis were selected from recent admissions and reviewed for comparison with the group of pellagrins.

"Of the fourteen cases of pellagra, six were profoundly alcoholic; three gave a history of dietary caprices; three were known to have lived under economic stress; one man in advanced years had arteriosclerosis; and one woman gave an uneventful life history except for a period of mild depression four years prior to the onset of pellagra."

Only 5 of the 14 pellagrins showed improvement or recovery, and 8 died. All the 14 cases showed central nervous system involvement.

Of the 6 cases diagnosed alcoholic psychosis the first two had definite pellagrous signs and symptoms, and in the others the presence of pellagra is at least suggested. The author is inclined to consider this group as abortive pellagra cases, and he finds that they usually rapidly improve if they can recover from the systemic effects of the alcohol.

Whether alcohol, as an etiological factor in pellagra, acts by virtue of its power of destroying appetite or whether it alters the metabolism, digestion and absorption, is not yet clear.

A. D. B.

VISWALINGAM (A.). **Observations on Pellagra and Keratomalacia.**—*Malayan Med. Jl.* 1929. Sept. Vol. 4. No. 3. pp. 97–103. With 5 figs.

Pellagra in Malaya occurs sporadically only among Chinese field labourers. The disease attacks adult male labourers alone. The first case in the Malay States was diagnosed and reported in 1917.

An account of the clinical appearances and possible etiology is given. It is interesting to note that the Chinese labourers' diet is rich in carbohydrate and very poor in protein and vitamins.

Patients suffering from keratomalacia are usually of the Indian community. This condition is, as a rule, found among children whose diet and that of the mothers during pregnancy and lactation is generally deficient, and more particularly lacking in fat soluble vitamins. As a result of this there is a predisposition to bacterial invasion as evidenced by catarrh of mucous tracts, bronchitis, and diarrhoea. The keratomalacia has an insidious onset beginning with denudation of the corneal epithelium, with later necrosis or secondary infection. Severe damage to the eye results and even blindness.

Definite improvement and, in early cases, complete cure has followed the giving of fresh milk, eggs, fruit, cod liver oil with Parrish's food and gingely oil to the skin. Locally, atropine is instilled into the eye and castor oil, olive oil or very weak yellow ointment is used as routine.

Dr. P. H. MARTIN found a low blood calcium figure in cases of keratomalacia. In one case diet and liver extract brought the blood calcium content back to normal.

A. D. B.

WILSON (William H.). **Note on the Etiology of Pellagra.**—*Brit. Med. Jl.* 1930. Jan. 18, pp. 101–103. [17 refs.]

In commenting upon the outbreak of pellagra described by CLUVER (see above) in the Durban prison command the author refers to the fact that three groups of prisoners in separate Institutions were affected as follows : In the first group of European and short term prisoners, 1·9 per cent. were affected ; in the second and third groups of hard labour, 3·8 per cent. and 8·2 per cent. respectively were the figures. The diets received by these prisoners are analysed to see whether they throw any light upon the protein deficiency or vitamin deficiency of pellagra.

In the author's previous work (*Jl. of Hygiene*, Vol. 20, 1921), it is pointed out that available protein in any diet is reckoned as the gross intake of protein less loss in the intestine due to failure of absorption (this loss may be as much as 33 per cent.). When the biological value of protein falls below 40 grams daily for non-labour communities and 45 grams for labour communities pellagra is likely to occur. In the four diets given to the Durban prisoners the biological value of protein figures were only 29·5, 28·5, 14 and 38 respectively. It is not surprising therefore, that pellagra developed, but even so it is remarkable that 10 cases were diagnosed after living on this defective diet for only three months, and that cases had not occurred in previous years. Since two cases were admitted to prison with the disease it is probable that food deficiency to some extent was already present when the diets were begun. These findings are certainly in favour of protein deficiency rather than P.P. deficiency being the cause of the outbreak.

The author next proceeds to criticize GOLDBERGER'S theory that pellagra is due to P.P. deficiency. The original experiments of GOLDBERGER have been repeated by other workers and no doubt exists but that a deprivation of B_2 Factor leads to a characteristic dermatitis in rats. It cannot be expected that a disease in man and in animals

should be exactly the same, but the absence of alimentary symptoms in the rats, the fact that the dermatitis is not related to exposure to light and the constant haematuria are certainly not like true pellagra. So, too, in experimental black tongue in dogs the symptoms rather resemble those of acute pellagra, but it is not curable, except in the early stages, by yeast and the work of UNDERHILL and MENDEL suggests that it is due to the absence of carotein. They find that a 5 mgm. daily dose of this substance cures the condition, while lean beef or yeast will not. The theory that pellagra is due to lack of vitamin B_2 needs further confirmation.

Analysis of diets associated with pellagra shows that the less the amount of animal protein present the greater is the likelihood of pellagra. AKROYD and ROSCOE have examined many food stuffs as to their vitamin B_2 content. From their tables the amount of vitamin corresponding to one gram of meat in its natural state can be determined. The following are the estimated figures: Meat, 1; beans (dried), 1·2; whole maize (African), 1·5; milk (natural), 2; maize meal or wheat flour, 2·8. Using these results a series of curative or non-pellagrous diets are compared with pellagra producing ones. The B_2 factor was found to be as high in the pellagra producing diets as in the others. It is therefore concluded that the disease is not due to lack of vitamin B_2, but to protein deficiency. There is, however, some evidence to show that the absence of sufficient B_2 in the diet may cause a secondary protein deficiency.

A. D. B.

WILSON (W. H.). **Recent Views regarding the Etiology of Pellagra.**—*C.R. Congrès Internat. de Méd. Trop. et d'Hyg. Le Caire, Egypte, Décembre, 1928.* Vol. 2. pp. 461–494. With 2 charts. [50 refs.]

The author recapitulates his work so clearly that his summary is given in full.

"In section 1 of this paper a number of institutional diets described by Goldberger and his associates are discussed and are compared with other diets known to have been pro-pellagrous or curative. It is shown that with the exception of two diets (in which yeast and tomato juice supplements appeared to be protective), the protein value gave a sufficient explanation of the results. In the two exceptional cases reasons are given for thinking further investigation is needed before it can be concluded that a vitamin deficiency can be the sole primary cause of pellagra.

"In Section 2 various experimental diets in animals are discussed. Reasons are given for doubting that the conditions produced in dogs and rats correspond to pellagra in man.

"In Section 3 an attempt has been made by classifying the components of various diets and comparing the results with the known pellagra incidence on these diets to correlate the probable vitamin content of the different classes of food-stuffs with the incidence of the disease. No such correlation is found unless animal foods in addition to the high value of the protein are equally rich in the B_2 factor as compared to foods from other sources.

"In Section 4 attention is drawn to the importance of Vitamin B_2 in protein metabolism and the possible bearing of this on the theory of the origin of pellagra among communities in which the protein content of the food is of low value. An attempt is made to harmonise the two views of the etiology of the disease."

The author concludes that: "(1) A study of the food conditions of communities affected by pellagra indicates that the usual essential cause

of the disease is a deficiency in the value of the protein intake. (2) Recently published work on the relation of vitamin B_2 to protein metabolism suggests that in persons living on the border-line of sufficiency in this respect the value of the protein intake would be the determining factor in the incidence of pellagra."

A. D. B.

AYKROYD (W. R.). **The Etiology of Pellagra.**—*Brit. Med. Jl.* 1930. Apr. 5. pp. 647–648. [19 refs.]

The author points out that a recent paper by WILSON (see above) dealing with pellagra etiology " tends to give a wrong impression of some recent researches in connexion with that disease." WILSON has shown that pellagra producing diets are composed of protein of low biological value. The figures for the biological value of proteins were worked out from Thomas' Tables which, it is contended by the author, have never been exactly confirmed and fallacies are apt to arise from the use of them. Thus THOMAS found for milk a value of 100 per cent., while MARTIN makes it only 51. THOMAS assigned a value of 29 per cent. to maize, whereas MCCOLLUM, using Thomas's method and working with pigs, found that zein could cover 73 per cent. of the animals' nitrogen expenditure. MITCHELL, working with rats, gave to maize the value 72 per cent. These and other experiments render it unwise to attach too much importance to current estimations of protein biological value.

In 1920, VOEGTLIN, NEILL and HUNTER showed that great improvement in pellagrins was brought about by giving a 95 per cent. alcoholic extract of ox-liver in daily doses equal to 1 kilo of fresh liver. The extract was practically free from amino nitrogen. GOLDBERGER found that casein (biological value 70 per cent.—Thomas) was useless to prevent the recurrence of pellagra. The undoubted therapeutic value of yeast has led GOLDBERGER to change from his amino acid hypothesis to that of a P.P. factor. Work on black tongue in dogs and experiments on rats seemed to justify GOLDBERGER, but the author states that experiments on rats cannot prove pellagra to be a deficiency disease.

The vitamin deficiency theory of pellagra appears to rest on approved facts, but " It remains to be seen whether the distribution of vitamin B_2 in food stuffs when known more completely will explain the epidemiology of pellagra in man." On this theory an explanation is, however, still wanting as to why the disease does not occur in ill-nourished populations where wheat flour is the staple food and in millet-eating and rice-eating communities.

A. D. B.

PRADOS Y SUCH (M.). Beitrag zum Studium der Pellagra. [**Study of Pellagra.**]—*Klin. Woch.* 1929. Oct. 1. Vol. 8. No. 40. pp. 1862–1864. With 2 text figs. [8 refs.]

The author, working in a mental hospital at Malaga, is of the opinion that pellagra is due to diet deficiency and more especially to deficiency in amino-acid and vitamins, particularly fat soluble D. The pathogenesis of the disease suggests changes in the sympathetic nervous system, suprarenals and in calcium metabolism. Variations in the free acid content of the stomach even in the same case ranging from

achlorhydria to hyperchlorhydria, among other findings, are taken to be a sign of sympathetic hypotonia.

After pigmentation following exposure to ultra-violet irradiations it has been noticed that the blood calcium content rises while the tyrosin and sugar values are diminished. Also, in pellagrous dermatitis a similar great increase in blood calcium was found. Improvement in the skin condition is coincident with a fall in the blood calcium. Investigations concerning adrenalin and tyrosin and pigmentation are in progress.

Treatment with vitamins, especially with a preparation called Nateina, was instituted. Eight tablets of this preparation were given daily. Five cases of pellagra are quoted in detail, with photographs, and in three of these Nateina was exhibited with good results.

A. D. B.

Tscholaria (D.). Zur Frage der Pellgraätiologie. [**Etiology of Pellagra.**]—*Nachrichten der tropischen Medizin.* Tiflis. 1929. Sept. Vol. 2. No. 7. [In Georgian script. German summary pp. 552–553.]

In order to investigate the extent and etiology of pellagra in Georgia one village was taken as a sample, every inhabitant being examined. Among 535 inhabitants, belonging to 110 families, there were found 54 cases of pellagra limited to 43 families. For the great severity of this outbreak the author blames a diet poor in proteins and in vitamins.

Among rich families, where meat could be procured four times a week, together with milk, no case occurred. All the cases were found among families which could only afford meat about once in three to four months, the staple diet being apparently maize and wild plums with, rarely, dried salt fish and more rarely still beans. Malaria and ankylostomiasis are contributory factors.

A. D. B.

Nasaretian (L.). Pellagra in Georgien [**Pellagra in Georgia.**]—*Nachrichten der tropischen Medizin.* Tiflis. 1929. Vol. 2. No. 8. [In Georgian script. German summary p. 617.]

The high epidemic incidence of pellagra in West Georgia demands, in the author's opinion, a number of prophylactic and therapeutic measures. Among half a million inhabitants of the affected districts 50,000 cases of the disease are known to exist. In the first place improvement of the diet of the population and the replacement of maize by wheat bread should be undertaken. Other recommendations are : Improved hospital facilities ; a central commission of specialists ; improved specialized education of the medical personnel ; the distribution of popular literature concerning the disease and a proper organization of the food supply.

A. D. B.

Alschibaja (K.). Zur Klinik und Therapie der Pellagra. [**Symptoms and Treatment of Pellagra.**]—*Nachrichten der Tropischen Medizin.* Tiflis. 1929. Vol. 2. No. 8. [In Georgian script. German summary pp. 616–617.]

In seven villages of Sugdidi, in Mingrelia, the author found 106 cases of pellagra among 488 sick persons attending for treatment, i.e., 21·7 per

cent. A closer study of these cases shows that in pellagra, besides the classical triad, other manifestations occur which point to a more widespread pathology. In the therapeutics of the disease arsenic holds chief place, combined with a rich and varied diet.

A. D. B.

Djaparidse (P.). Zur Erage [? Frage] der Pellagraepidemiologie in Abchasien. [**Etiology of Pellagra in Abkhasia.**]—*Nachrichten der tropischen Medizin.* Tiflis. 1929. Vol. 2. No. 9–10. [In Georgian script. German summary pp. 703–704.]

There has recently been an increase of pellagra in Abkhasia. Thus, the 1927–1928 expedition found only 0·3 per cent. of pellagra patients among all cases examined, while in the spring of 1929 a similar examination revealed the following percentage incidence of the disease : 7·8 in Gali, 5 in Suchum and Kodori, and 3 in Gudauti. Economically, Gali is the poorest, and Gudauti the richest district. Over three-quarters of the affected persons had consumed inferior, imported maize during the previous two years ; their normal diet consists of beans, maize, an extract of sour plums prepared with pepper, fruit and, occasionally, cheese and milk. Meat is very rarely obtained, and during the last two years fruit has been scarce on account of droughts. The author's statistics show that the pellagra incidence is greater on the sea-board, in spite of the relatively better milk-supply, and less in the mountainous districts where grapes are grown. He further cites malaria and ankylostomiasis as contributory causes of the disease.

A. D. B.

Dostrowsky (Arie). Ueber Pellagrafälle in Palästina. [**Pellagra in Palestine.**]—*Arch. f. Dermat. u. Syph.* 1929. Dec. 19. Vol. 159. No. 1. pp. 112–123. With 5 text figs. [10 refs.] [Rothschild Hosp., Jerusalem.]

The author describes in detail 5 cases of pellagra and 6 further cases of pellagroid. From his experience it appears that the disease is more widely spread in Palestine than is commonly believed, and that it affects the original stock and immigrants to an equal extent ; neither race, sex nor colour seem to enter into the etiological picture. Insufficient and unsuitable diet, especially as regards proteins, is adduced as the cause of the appearance of the disease, but the consumption of maize played no part whatever in the etiology of the cases described. The author concludes with some interesting observations on ultra-violet irradiation : he was unable to find an increase of photo-sensitivity in the cases examined, and in addition stresses the fact that the typical eruption of pellagra is not necessarily confined to those parts which are exposed to the action of sunlight.

A. D. B.

Gatschetschiladse (J.). Meteorologische Verhältnisse der Jahre 1927, 1928 und 1929 und deren Zusammenhang mit den Missernten dieser Jahre als Material zum Studium der Pellagraätiologie. [**Meteorological Conditions and the Bad Harvests of 1927-1929 in Relation to Pellagra Study.**]—*Nachrichten der tropischen Medizin.* Tiflis. 1929. Vol. 2. No. 9–10. [In Georgian script. German summary p. 703].

The author describes at length the meteorological conditions of the years 1927–1929 which resulted in poor harvests. The percentage figures

compared with previous normal averages were in these years 87, 97 and 57 per cent. respectively. Not only the maize but other crops also suffered. He is of the opinion that with the institution of other field meteorological stations useful information would be obtained regarding crop statistics. The compilation of a drought-incidence calendar is an urgent necessity.

A. D. B.

Brace (Robert W.). **Pellagra resulting from Self-imposed Deficient Diet.** *U.S. Veterans' Bureau Med. Bull.* 1929. Oct. Vol. 5. No. 10. pp. 794–797.

The patient, a white male, aet. 41, was admitted in September, 1928, to the U.S. Veterans' Hospital, Fort Snelling, Minnesota. In 1920 mitral regurgitation was diagnosed and in 1922 mitral stenosis. In 1923 the first diagnosis of neurasthenia was made. Early in the summer of 1928 what was apparently a pellagrous eruption was noted on the hands and wrists. He gave a history that for several years he had lived on a self-imposed, very much restricted diet, vegetables particularly being reduced. A table of his diet is given, but doubts as to its accuracy are suggested. In addition to the desquamation of the hands there were bullae on the hands and face, a red tongue, diarrhoea, emaciation and hyperchlorhydria. These signs, together with the fact that on a balanced diet with no other treatment he gained 7 lbs. in eight days, led the author to believe that the case was one of pellagra due to vitamin deficiency.

A. D. B.

Nicolas, Lacassagne (Jean) & Froment (Roger). Un nouveau cas de pellagre. [**A Fresh Case of Pellagra.**]—*Bull. Soc. Française Dermat. et Syph.* 1929. July. No. 7. pp. 697–698 (R.L. 371–372).

A case is described of a woman, aet. 34, who entered the dermatological clinic at Antiquaille with an eruption on the dorsum of the hands and forearms and with weakness of the legs. The erythema first appeared about Easter, but it had been preceded by digestive troubles and profound anorexia since December. She had never eaten maize, but for more than four months she had lived exclusively on eggs and vin sucrée, the latter in large quantity. In addition to the typical pellagrous eruption, the tongue was red and great weakness and apparently some nervous symptoms were present.

Pellagra is rare in France, but one of the authors has noted 15 cases in the last 20 years. Of these cases only one had eaten maize but all had lived upon an insufficient and one-sided dietary. Alcohol, too, seems to have played a part in the etiology.

A. D. B.

Meyer (Gougerot Jean), Oferlé & Uhry (P.). Pellagre et erythème pellagroïde. Formes de transition. La pellagroïde est une pellagre incomplète et attenuée. [**Pellagra and Pellagroid Erythema.**]—*Bull. Soc. Française Dermat. et Syph.* 1929. Nov. No. 8. pp. 1018–1019.

The authors describe a case which in June, 1929, had what they call pellagroïde, that is, an erythema with no other signs of pellagra. Later true pellagra developed with sore tongue, fever, anorexia, intestinal paralysis and death. The etiology is obscure as the patient had lived upon a good diet and had partaken of it freely. Other cases are discussed which bear out the contention that this pellagroïd condition is mainly an incomplete and attenuated form of pellagra itself and at any time may develop into it.

A. D. B.

ELLIS (R. W. B.). **Pellagra Secondary to Gastro-intestinal Disease.**—*Amer. Jl. Dis. Children.* 1930. May. Vol. 39. No. 5. pp. 1036–1044. With 2 text figs. [13 refs.] [Children's & Infants' Hosps., & Harvard Med. School, Boston.]

A very full account of the literature dealing with pellagra occurring in cases of gastro-intestinal disease is given. The author describes in detail a similar case in his own practice.

An Italian boy, aet. nine years, sent to hospital for loss of weight, anorexia and diarrhoea of three months' duration. The family lived in Lawrence, Mass. The boy had received the ordinary diet of an Italian family, viz.: macaroni, potatoes and bread. Milk was plentiful and meat and eggs were frequently eaten, but in small amounts. Fresh vegetables were a rarity. He had been apparently quite well up to three months before admission. A symmetrical dermatitis of the hands soon appeared, and later crusted lesions were noted on the face, scalp and neck.

The tongue was slightly reddened, diarrhoea was profuse, but neurological examination was negative. There was a secondary anaemia with lymphocytosis and achlorhydria, Later, a diagnosis of tuberculous entero-colitis was made in addition to pellagra. In spite of high protein diet, yeast, etc., he continued to run a high temperature and he was transferred to a sanatorium where he died in August, 1929. (He was admitted to the Children's Hospital April 30th, 1929.)

The author is of opinion that the tuberculous intestinal disease interfered with adequate assimilation and thus pellagra was caused. He thinks that especially in sporadic cases of pellagra a search should be made for co-existent gastro-intestinal disease, and he warns surgeons of the risk of operating in certain cases lest a pellagra condition should be precipitated.

A. D. B.

CARLEY (Paul S.). **The Use of Dried Brewers' Yeast in the Treatment and Prevention of Pellagra.**—*New Orleans Med. & Surg. Jl.* 1930. May. Vol. 82. No. 11. pp. 740–744. [3 refs.]

Treatment with dried brewers' yeast has been tried upon 176 negro pellagrins in Humphrey's County, Mississippi, since August, 1927. It was found that doses of 1 oz. per diem greatly assisted in allaying the symptoms. Upon the withdrawal of the yeast relapse occurred within a year in about one-third of the cases unless other steps were taken to make good the vitamin deficiency. " A daily dose of one ounce of dried brewers' yeast during the period May to October and half an ounce daily from October to May prevented the recurrence of symptoms of pellagra in all of 38 cases, over a period averaging 13 months."

It is pointed out that the ultimate control of the disease is a matter of dietetic education and that yeast should be used only in treatment or until a well-balanced diet can be instituted.

A. D. B.

GOLDBERGER (Joseph) & WHEELER (G. A.). **A Study of the Pellagra-preventive Action of Canned Salmon.**—*Public Health Rep.* 1929. Nov. 15. Vol. 44. No. 46. pp. 2769–2771. [3 refs.] [Summary appears also in *Bulletin of Hygiene.*]

Eighteen female patients of the Georgia State Sanitarium, Milledgeville, Ga., were maintained over a period, in each case of at least a year,

on a pellagra-producing diet supplemented by six ounces of canned salmon (Alaska Chum) per day. None of the patients presented any symptoms suggestive of pellagra during the period of observation. Canned salmon is, therefore, considered a fair substitute for meat in the areas of pellagra endemicity when the latter is not readily available. Since canned salmon is now known to protect against both pellagra in man and blacktongue in the dog, the hypothesis that one disease is the analogue of the other therefore receives support.

A. F. Watson.

Dorogan (D.) & Capri (M.). Chronaxie et contraction musculaire dans la pellagre. [**Chronaxia and Muscular Contraction in Pellagra.**]—*C.R. Soc. Biol.* 1930. Feb. 14. Vol. 103. No. 6. pp. 449–450. With 1 text fig.

Researches upon chronaxia and muscular contraction carried out in 21 pellagrins, exhibiting various degrees and stages of the disease, revealed the fact that a general muscular hypertonus exists in pellagra similar to that found in paralysis agitans and in post-encephalitic Parkinsonian states. It is probable that in pellagra, as in Parkinsonianism, there is a lesion of the locus niger and globus pallidus giving rise, by absence of inhibition, to a reflex muscular hypertonicity.

A. D. B.

Scott (L. C.), Turner (R. H.) & Mayerson (H. S.). **Spectrographic Examination of Pellagrins' Sera.**—*Proc. Soc. Experim. Biol. & Med.* 1929. Oct. Vol. 27. No. 1. pp. 27–29. With 1 text fig. [2 refs.] [Med. School, Tulane Univ., New Orleans.]

The observation that exposure to sunlight probably causes or increases the erythema of pellagra and a consideration of the skin manifestations of hydroa aestivalis, buckwheat disease and other forms of sensitization in animals, suggest the presence of a toxin circulating in the blood in these diseases. The sera of 13 acute pellagrins in the New Orleans Charity Hospital were examined by means of a Hilger Quartz Spectograph in order to see whether haematoporphyrin or similar substance was present in the blood. The authors state that in no instance were they able to find any spectroscopical difference between pellagrous and non-pellagrous serum. Control experiments with normal serum containing traces of haematoporphyrin left no room for doubt that this pigment is not present in the blood of pellagrins. Experiments on urine gave the same negative results.

A. D. B.

Abascal (Horacio). Reseña historica y sinonimia de la pelagra. [**Historical Review and Synonymy of Pellagra.**]—*Crónica Méd.-Quirúrg. Habana.* 1930. Feb. Vol. 56. No. 2. pp. 72–75.

The historical part of this article is brief and not very informative in view of the fact that diagnosis some 350 years ago was none too accurate, and many of the names are merely place names, such as Asturias disease, Lombardy eruption and Italic scurvy. The latter part consists of a list of synonyms, mostly Italian, of which there are 42, next French 27, Spanish 8, other countries in smaller numbers. They are tabulated for ease of reference by those interested.

H. Harold Scott.

REVIEWS AND NOTICES.

CAIRO. **Congrès International de Médecine Tropicale et d'Hygiène, le Caire, Egypte, Décembre 1928. Comptes Rendus publiés par** M. KHALIL. **Volume II. Histoire de la médecine—Maladies internes—Maladies des enfants.** [International Congress of Tropical Medicine and Hygiene, Cairo, 1928.]—pp. vii+1002. With numerous illustrations. 1929. Cairo. [P.T.50]

This is the second volume of the records of an international Congress of medicine held in Cairo in December, 1928, which attracted many interesting people from an extended area, India, Germany and Austria. The official language was French, but the volume contains papers in English, German and Arabic. Three Sections are included in this volume: The History of Medicine; Internal Maladies; Diseases of Children. The history of medicine group contains twelve papers of reasonable length dealing with ancient Egyptian medicine; methods of diagnosing diseases by ancient Egyptians; original contributions to medicine by the Arabians; history of hospitals during the Islamic era, etc. Naturally, the second section contains the largest number of papers; 24 were read at the meetings and 23 others were accepted for publication. Some of these papers will receive further notice in this *Bulletin*. The section devoted to children contains papers on cranial measurements of Egyptian children normal and abnormal, standard development and infant mortality, as well as others dealing with special diseases. There are some interesting illustrations in the historical section, taken from ancient figures and statuettes, showing: hydrocephalus, achondroplasia, rickets and elephantiasis.

J. H. Tull Walsh.

SÃO PAULO. **Terceiro congresso brasileiro de hygiene. Realizado em São Paulo de 4 a 12 de novembro 1926.** [Third Brazilian Congress of Hygiene 1926.]—pp. xi+938. Ill. 1929. São Paulo Editora Ltda. Rua Brigadeiro Tobias Nos. 78–80.

This heavy volume of over nine hundred pages contains the records of the work done at the Congress of Hygiene held in S. Paulo in November, 1926. It has taken three years to edit and publish the papers read and no doubt those who attended the Congress will be glad to see a permanent record. Fortunately, the success of such Congresses does not entirely depend on the output of printed matter. The work of the members of the Congress is divided into twelve Sections: Flies and epidemiology; Purification of water supplies; Value of light and cleaning of houses in preventing malaria; Helminths; Leishmaniasis; Epidemiology in prevention of malaria; Municipal hygiene; Epidemiology and prevention of typhoid; Epidemiology and prevention of leprosy in Brazil; Drainage; Public milk supply; and Welfare of children and formation of sanitary habits. It is quite impossible to consider the papers in detail, and there are none which contain much original matter. At the end of each section there is an article by a sectional editor which reviews the papers read in the Section. The book is illustrated with photographs, maps, charts, etc., and well printed, on good paper.

J. H. Tull Walsh.